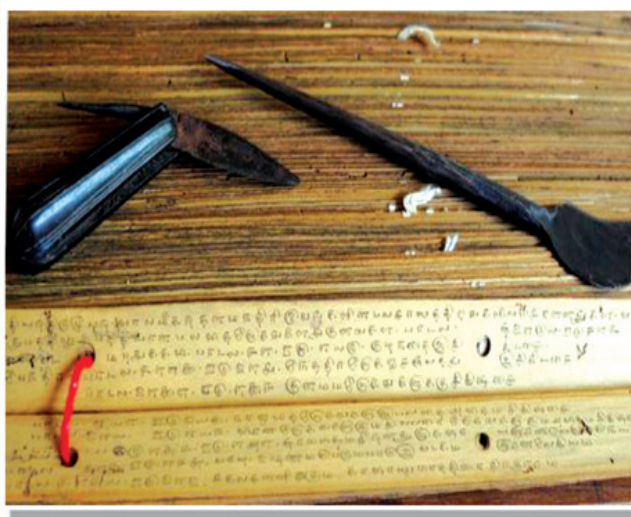


Manuscript Conservation

Past and Present



by

Dr. P. PERUMAL

**MANUSCRIPT
CONSERVATION
PAST and PRESENT**

by

Dr. P. PERUMAL

Former Conservator
Sarasvati Mahal Library
Thanjavur

KOVILOOR MADALAYAM

Koviloor - 630 307
Karaikudi, Tamilnadu.

Title : **Manuscript Conservation :
Past and Present**

Author : **Dr.P.Perumal**

Translated from
Tamil : **Dr. P. Ramasamy**
Formerly Associate Professor of English
Government Centre for Postgraduate
Studies, Pondicherry.

Language : English

Subject : Manuscript conservation techniques

Edition : 1st Edition, 2021

No. of pages : XVI, 136 P + 8 Pages illustrations

Paper : 80 gsm Natural Shade

Price : Rs. 150/-

© Author

Publisher : **Koviloor Madalayam,**
Koviloor- 630 307
Karaikudi, Tamilnadu
Email : koviloormutt@gmail.com

Printing and
cover design : **Himalaya Offset Printers**
2651/34 B, First floor,
Emerald Complex,
Trichy Main Road,
V.O.C. Nagar, Thanjavur - 613 007.
Phone : 04362-272755

**To Dr. O.P. Agrawal
and other Conservators
who dedicated their Lives
for Conservation of Cultural
Properties in India**

கோவிலூர் மடாலயம்
கோவிலூர் - 630 307.
(வழி - மாணகீர்)
சீவகங்கை மாவட்டம்



☎ 04565 - 236846

தமிழ் 15.09.2021

BENEDICTIONS

by

Seer Valar Seer

Meyyappa Gnana Desika Swamigal

KOVILOOR ADHEENAM

The Tamil language is among the few most ancient languages of the world. Born several thousand years ago and developing from the spoken to the written form it bloomed into literary genres like verse, tales in prose and the essay. The Tolkappiam, a text on the codes of Tamil grammar, appeared earlier to 7th century BCE. Starting from this text, other Sangam Age literary masterpieces that came after it, and literary works that were produced still later are all available to us today, thanks solely to palm leaf scripts. Following the use of stone and copper plate inscriptions, in Southern India, by and large, palm leaf was used to write upon. Though these manuscripts got destroyed due to various natural causes, copies had been made by our forbears in the interest of preserving the precious thoughts recorded in them. Such copy manuscripts on palm leaves were stored in temples, royal palaces, religious mutts and in the homes of pandits. These manuscripts too got destroyed due to other reasons – adoption of the Western system of education, wars between rulers, religious bigotry, and a lack of awareness of their importance. Therefore it is

the bounden duty of every one of us to save the surviving manuscripts.

This book, **Manuscript Conservation: Past and Present**, written by Dr. P. Perumal, Conservator, Sarasvati Mahal Library, Thanjavur, would benefit all readers interested in the history of the palm leaf manuscript – methods of inscription, factors that cause damage to it, methods of preservation, periodical inspections, and traditional as well as modern scientific means of preservation.

The late Sri la Sri Nachiappa Swamigal paved the way for undertaking several measures through this mutt for the upkeep and preservation of our traditional artefacts. As a part of this initiative and as per his benediction and good wishes, the Koviloor Mutt took up publication of Tamil version of the book in 2012. The translation of the above book in English is now brought up. It would be of great use to libraries holding palm leaves, palm leaf enthusiasts and specialists as well as the lay reader.

The author of this book has a special regard for our mutt and fondness for us. He had helped a great deal in the preservation and deciphering of the palm leaf manuscripts in our collection. I convey my greetings and good wishes to his literary venture.

Sri Sargurunadhan Thunai

Koviloor
15-9-2021



HEPZIBAH INSTITUTE OF HERITAGE CONSERVATION,

21, V. O. C. Street, MGR Nagar, Chennai-600 078.

E-mail ID: drvjeyaraj@gmail.com;

Mobile: 9381008253 / 044-24745944

Dr. V. Jeyaraj,

Director

FOREWORD

It was a revolution in communication when a script allowed individuals to share information without meeting face to face. Writing also made it possible to store information, creating a pool of knowledge well beyond the ability of any single human to master yet, at the same time, available to all. Writing is regarded as the threshold of history, because it ended the reliance upon oral tradition, with all the inaccuracies this entailed. Finally, among the innumerable benefits created by a script, writing allows us to capture our ideas

Dr. P. Perumal, the former Conservator of the Sarasvati Mahal Library, Thanjavur with his physics and library science back ground entered in to the field of preservation and trained both in India and abroad and acquired a name in the preservation of manuscripts with his interest in the field.

In his book, **Manuscript Conservation: Past and Present**, Dr. Perumal begins with the origin of alphabets in various parts of the world as well as in India, manuscripts and their classifications, writing materials, viz. Metals, botanical parts such as leaves, barks, wood, cloth and zoological materials such as parchment, leather, bone, ivory etc. He deals with palm-leaf manuscripts starting from their preparation, types of

palm trees, writing methods, writing tools, shapes of manuscripts, binding and their preservation. Similarly he writes about the invention of paper, preparation of paper from various plants, their methods of preparation, writing methods, inks, brushes etc.

He narrates the various causes of loss of manuscripts viz. Biological, physical, chemical and human factors such as ignorance, negligence, carelessness, improper handling etc. He mentions the preventive measures such as storages, use of insecticides, repellents, housekeeping etc.

He portrays the various modern storages, usage of herbal and chemicals to drive away pests, cleaning methods, application of oils, rejuvenating letters etc., as curative conservation. In the chapter on restoration he writes about stains and their removal, repairing methods, lamination including encapsulation. He narrates the methods of preserving the contents of manuscripts using modern technologies. He tells the readers to be aware of the preservation of manuscripts in libraries, repositories etc. He applauds the role of temples, mutts etc., in the preservation of manuscripts. He also deals with the various libraries which preserve manuscripts and the dynasties which help in the preservation of manuscripts in India and abroad.

He tries to portray the various scientific institutions, which help in the conservation and restoration besides carrying out research and providing training in conservation and restoration of manuscripts. He concludes with the various aspects of taking care in handling the manuscripts to preserve the manuscripts for posterity.

I believe that this book will be a handbook to those who are dealing with the preservation of manuscripts in order to preserve the manuscripts for posterity.

Chennai
19-09-2021.

Dr. V. Jeyaraj

K.K.GUPTA,

Formerly, Restorer, National Museum,
Consultant, Indira Gandhi National Centre for the Arts,
Consultant, INTACH
New Delhi

FOREWORD

From the beginning of civilizations, manuscripts have been written on diverse materials, such as stone, metal, papyrus, palm leaf, cloth, birch bark and paper. They constitute a significant component of the cultural heritage of many nations. These manuscripts are held in various cultural organizations such as museums, archives, manuscript repositories and many religious institutions, apart from holdings by individuals.

These manuscripts have their importance for all of us, as the handiwork of our forefathers as well as a treasure house of the enormous amount of knowledge on almost all the subjects such as medicine, literature, architecture and religion.

However, as in case of all objects, these are also subject to deterioration. In order to pass these on to posterity, different materials and techniques had been used by our predecessors. But much of this information is not easily accessible. In order to fulfil our duty of saving this written heritage to pass on to future generations, we need to know the traditional as well as modern scientific methods to protect these manuscripts.

I am happy that in order to share his knowledge of the history and conservation (traditional as well as modern) of these manuscripts with younger generation of manuscript conservators and other interested individuals, Dr.P.Perumal has brought out this volume dealing with various different aspects of creation, deterioration and conservation of these manuscripts. Perumal is a reputed manuscript conservator

himself, and has been in the field of conservation of manuscripts of various types for about four decades. He was involved in conducting many workshops or delivering lectures on conservation of manuscripts in various institutions. He has also authored a number of articles, dealing with conservation of manuscripts based on his long experience in the field, in many periodicals.

In the present work, Shri Perumal, after providing a brief introduction to the subject, discusses details of ancient Manuscriptology and the preservation of manuscripts. This book provides a valuable window of information on different aspects of manuscript heritage, such as their making, their languages, deterioration and methods of preservation, traditional as well as modern; his main focus being palm leaves of different types and from different places.

I am sure this book would be well received by museologists, conservators, manuscript collectors and other interested individuals, and would prove to be of immense value to students of conservation and museology. I congratulate Dr.P.Perumal on this significant venture, and I hope he will bring out more publications dealing with the subject.

New Delhi
01.09.2021

K.K.GUPTA

Prof. A. Srimurugan

Former University Librarian and Head,
Department of Library and Information Science,
Madurai Kamaraj University, Madurai – 625021.
Email: sriwinsall@gmail.com

FOREWORD

Conservation and preservation of Palm Leaf Manuscripts has been a challenge for long throughout the world. This book is of greater value and significance at a time when the conservation and preservation of Palm Leaf Manuscripts has begun to attract the attention of the Curators, Librarians, Scholars and the Government authorities as well. Technology comes to the rescue. But, it is a well known fact that digitization of old records is possible only if they are conserved and preserved.

I am happy and proud of Dr. P. Perumal, a Library and Information Science product of the Madurai Kamaraj University of the 1985 batch. He served as the first scholarly-trained conservator at the Sarasvati Mahal Library, Thanjavur which has a large collection of Palm Leaf Manuscripts besides wonderful artefacts. He obtained his knowledge and experience in reputed international institutions at Lucknow, New Delhi, Kolkata and London. His innovative, indigenous methods of preserving of Palm Leaf Manuscripts with spices and organic materials have been recognized by the scholar community. This book exhibits his rich knowledge and experience in the conservation and preservation of Palm Leaf Manuscripts.

Palm leaves, as a convenient medium for writing, were popular once among the scholars in the South and Southeast Asia. South India is one of the major and significant contributors to the development of knowledge recorded and transmitted through palm leaf manuscripts which constitute the memory of history, heritage and knowledge in traditional systems of medicine, building, literature, astrology, religion, philosophy, and more. Palm leaf manuscripts, as natural organic materials, are susceptible to chemical, physical, and biological degradation. Conservation experts of modern times found that palm leaf manuscripts can last a millennium or more if treated well. It is our responsibility to conserve and preserve Palm Leaf Manuscripts for posterity. Palm Leaf Manuscripts are evidences for the rich heritage of knowledge existing in India since ancient times in various subjects from which the younger and future generations can learn and gain, and draw a moral strength.

This book, **Manuscript Conservation: Past and Present** written in the style of a text book with research orientation, should be useful to curators, librarians, research scholars, academics and archive institutions.

Madurai,
Sep. 2021.

Prof. A. Srimurugan

AUTHOR'S PREFACE

A nation's culture expresses itself in its literature. India had excelled in her letters, art and culture for more than three thousand years. The human kind recorded their experiences in the wake of their civilized living. These records are none other than manuscripts. It is through them that we have now with us the literary works that had been created several thousand years ago. In India these were inscribed on stone, clay tablet, metal sheet, cloth, tree barks, palm leaves and, of course, paper. But what exist now are mostly in palm leaves and paper. Preserving them in countries of hot climates poses great problems. Manuscript libraries or repositories adopt various preservation techniques and materials. Due to Western influence, chemical substances began to be largely used. Even today they are being used due to non-awareness of the damages in the long run caused by these substances on manuscripts.

It was a great gift in my life that I got the opportunity to serve as conservator in the Sarasvati Mahal Library in Thanjavur, one of the oldest in India. On account of it, and from knowledge obtained from several other institutions, I undertook research work for a doctoral degree in the Palm leaf Manuscript Department of Tamil University in Thanjavur. As a part of this research I undertook study tours to several manuscript libraries and archives in South India. Through other means too I learnt of the palm leaf manuscripts by stylus, methods of paper making, their

handling and preservation, causes of damage, traditional modes of their preservation as well as modern, scientific methods, natural substances utilized in preservation and also synthetic, chemical materials. All such data that I had collected for my thesis, have been used in this volume.

At the outset, my salutations to His Holiness Shri La Shri Nachiappa Swamigal, Former Mutt head of the Koviloor Mutt, near Karaikudi in Tamilnadu for having gone through the handwritten copy and accepting to publish the Tamil version of this book. I express my gratitude and salutations to the present Mutt Head Seer Valar Seer Meyyappa Gnana Desika Swamigal for consenting to publish this book "Manuscript Conservation: Past and Present" and for his benedictory note.

My gratitude's are to (late) Dr O.P. Agrawal, former Director, National Research Laboratory for Conservation of Cultural Property, Lucknow and former Director General of INTACH Indian Conservation Centres who had been a guide, teacher and mentor to me for my development in the field of conservation of manuscripts and books.

I wish to express my sincere gratitude to Dr V. Jayaraj, former Chemical Curator, Government Museum, Chennai and Shri K.K.Gupta, former Restorer, Conservation Laboratory, National Museum, New Delhi for their forewords to this book and their guidance in my work. I thank the late Dr. T.G.Paramasivam, former Professor and Head, Department of Palm Leaf, Tamil University, who had been my research guide.

I express my feelings of fond gratitude to the following, who had all been a source of strength and encouragement all through my period of work : Dr. S. Narendran, M.S.,Ph.D., and Prof A.Srimurugan, former University Librarian and Head, Department of Library Science, Madurai Kamaraj University.

I thank Messrs. Himalaya Printers of Thanjavur for getting this book printed with good quality in a short time; and Sri Jayanthi Gowri krishnan, USA who provided guidance in getting this book published.

This book is a true homage to my parents whose upbringing paved the way for this venture of mine and to members of my family, without their whole-hearted co-operation this publication would not have been possible.

My prayers to the Almighty Guru Ramana, who leads me.

25.9.2021

Dr. P. Perumal

Thanjavur

For communication

Dr. P. Perumal,

35/53, Ponni Nagar, Balobanandavanam,

Thanjavur - 613 008.

Tamilnadu.

E.mail : drperumalp@gmail.com

CONTENTS

Chapters	Subjects	Page No.
	Introduction	15
I	Writing Materials	23
II	Palm Leaf Manuscripts Preparation	32
III	Preparation of Paper Manuscripts	51
IV	Causes of Deterioration and Loss	59
V	Preventive Conservation of Manuscripts	79
VI	Curative Conservation of Manuscripts	90
VII	Manuscripts Collection and Conservation Awareness	106
VIII	Scenario of Conservation Activities	127
	Conclusion	141
	Reference Books	144

INTRODUCTION

In the beginning, mankind the world over had used various methods for communicating their knowledge and experience to benefit their fellow beings. At first they made use of signs, later augmented them with vocal sounds which later evolved into language. As civilization grew, man started recording his thoughts and ideas, so as to benefit not only his contemporaries but for the succeeding generations as well. He made this recording through lines, symbols and line drawings. These were later developed into alphabetic letters.

Origin of Alphabets

Early man recorded information by drawing lines, symbols and pictures. We may say that these indeed evolved into the alphabets. The invention and growth of the alphabet is a landmark in the history of civilization. It may not be an exaggeration to say that the invention of the alphabet paved the way for various other inventions and discoveries (Richardson 64). Early writings were pictograms – resembling the shapes of humans, animals, birds and other articles of everyday use (Brookfield 6). This pictorial-alphabetic method is said to have existed as early as 3300 BCE.

The earliest manuscript known is from the Sumerian clay tablets obtained from the archaeological excavation of the Uruk (Iraq) town of Mesopotamia and belonging to 3300 BCE

(Robinson 11). Such engravings on clay tablets are called cuneiform letters. Likewise, writing by engraving grooves on brick and stone materials are considered very early forms of records. Later, by employing this method, icons and alphabets were formed in *bas relief*. It is agreed that the Sumerian letters discovered in Mesopotamia are the oldest known letter form in the world (Robinson 12). Following this, writings belonging to 3100 BCE in Egypt, 2700 in Babylonia, 2500 in Indus valley, 1200 in China, and to 500 BCE in Central America have been discovered (Robinson 11).

The very famous Rosetta stone has writings of hieroglyphic characters. A rendering of this pictorial text in Greek alphabets is found engraved immediately under it. These alphabets help to decipher several other such pictorial stone inscriptions (Kanthaiya Pillai 12). In Egypt a good number of papyrus manuscripts carrying Greek alphabets are found. During excavations in Saqqara in Egypt, the statue of a scribe was found, which is estimated to be 4500 years old. It depicts a scribe writing on papyrus (Robinson 106). Likewise, the Mesopotamia excavations brought up the statue of Hesire, the Chief Scribe of the royal court, holding a pen in his hand (Robinson 106). These findings reveal the existence of writing in ancient times.

From the excavations of Mohenjo-Daro and Harappa in the Indus Valley, highly evolved forms of town layouts, walls, towers, idols, clay tablets, seals, clay ware, metal sheets, elephant tusks and bones were discovered. The writings found in them have been proved to be very ancient. Their characters bear a similarity to Tamil alphabets (Robinson 148).

Rock paintings of very ancient times are found in Mount Kaimur in the Vindhya ranges of India and in certain other places. Sea trade existed between the West and India even earlier than 1500 BCE. Trade movements went on from the Indus delta in India, via the Arabian Sea and through the Euphrates valley. This sea route is a very ancient one. The copper plates of King of Mitanni country bear testimony to trade links via this route. These copper plate engravings were made in 14th century BCE. In the “Ashurbanipal” Library in 668-662, we find the word ‘Sindhu,’ used to mean ‘Indian cotton.’ (Kanthaiya Pillai 12). The existence of trade between India and Babylonia comes to light from a historian’s recording of King Solomon IV of Assyria receiving gifts of animals like camel, horse and peacock.

The names of animals and other materials, which have gone from India to Egypt, Greece, Babylonia and Palestine, underwent a corruption while in usage there (Kanthaiya Pillai 204). We learn that rice from India and the peacock bird were taken to Babylonia even before 460 BCE (MacDonald 7). In 1921, when excavations were made of buried townships in the Indus valley, archaeologists observed similarities in several of the ancient articles to those used by the Tamils (Kanthaiya Pillai 206). H.H. Risley, in his book *The People of India*, points out that the geological land mass of southern India is of great antiquity on earth. Though India had a rich and ancient heritage in learning and civilization, monuments of this civilization like historic buildings, palaces, temples, and public places have all perished or buried due to natural disasters like river floods, sea erosions and tidal waves. When some of these buried sites were excavated, different kinds of writing materials and documents were unearthed. Though India’s civilization and culture is on

par with those of other nations with a hoary past, what evidence of it available in stone inscriptions and copper plates by and large belong to the period beginning from 6th century BCE. The texts inscribed on stones and copper plates were first inscribed as draft copies on palm-leaves. This is evidenced by the several palm-leaf documents that are still available. From this, one may conclude that the practice of inscribing and making draft copies in palm leaves prevailed even prior to 6th century BCE.

Rise of the Written Alphabet in India

During the ancient times knowledge gained by someone was orally transmitted to others. This mode of transmission was known as *shruti* [sound]. The history of the conversion of such orally transmitted knowledge into the medium of writing has been documented in twenty-five pages by Max Muller in his history of Sanskrit literature written in 1859, where he mentions the rise of written texts in this country. Likewise, the scholar of Oriental studies, Georg Buhler traces the development of written letters from 300 BCE upto 1300 CE. More importantly, the tenets of Buddhism in Pali script, belonging to 5th century BCE have been found. This is considered to be the earliest of the available text documents of India (Losty 5). In Tamil Nadu, a hero stone (is a stone erected in memory of commemorating the honourable death of a hero in battle) with scripts belonging to 3rd century BCE was found in the hills near Kodaikanal of Dindigul District.

We come to know that early alphabets of India made use of pictograms like those of Chinese and Mohenjo-Daro scripts. Though such scripts in Tamil have not been discovered, we learn of their use in Tamil from *Yapparunkala-vritti*, an 11th century commentary on the Tamil grammar classic

Yapparunkalam. In spite of it, in certain places, use of icons and symbols are preferred over alphabetic writing. We can therefore say that symbols and icons convey information or instruction more easily than alphabetic scripts.

Human knowledge and experiences were recorded on various materials using alphabets for the benefit of others. At first writings were done on rock surfaces and on walls of caves in the form of both drawings and texts. A rock surface is an immovable one. It cannot be carried or relocated. To overcome this handicap, stone tablets, bricks, clay tablets and metal sheets were used as writing surface. However, making and handling them proved cumbersome. So man started using materials which were easy to obtain, light enough to handle and soft enough to write upon, such as vegetative matter, animal skin, and bones. Vegetative materials used to write by hand were mainly papyrus (which is a laminate created from a type of reed), barks of trees, wooden planks, bamboo splints, and cotton fabrics.

Manuscripts

Writing on the above materials by hand is called manuscripts. Manuscripts are a form of recorded information, which is the vehicle for preservation and dissemination of knowledge to endless generations to come. Generally manuscripts are rare commodities written on wide range of subjects like religion, philosophy, history, literature, medicine, and science. Before the advent of paper, palm leaves were mostly used for writing in South Asian countries, in particularly in South India. In India even though various writing materials were used for recording, prevalently birch bark and palm leaves were used. After the introduction of paper usage of ancient writing materials was reduced. Palm leaves were used for writing until the 60s of

twentieth century. Today, these manuscripts, written in and belonging to India are seen not merely in the libraries of this country but are found elsewhere too, carried abroad in the past by visiting scholars, lay visitors and tourists, western bureaucrats, and lovers of art. These were displayed in the libraries of their country. From time to time lists of historical manuscripts were made by enthusiastic individuals and also by government and private bodies in India. Still, we see little awareness regarding manuscript preservation, compounded by inadequate preservation facilities in government and private organizations in India, except perhaps in museums and manuscript libraries.

Manuscript Classification and Preservation

Manuscripts have been grouped under various categories: 1) based on the material medium on which they are scripted, they are classified as palm-leaf manuscripts or paper manuscripts; 2) based on the method or manner of scripting, as illustrated manuscripts or illuminated manuscripts; 3) based on the language used for scripting, as Tamil manuscripts, Sanskrit manuscripts, Telugu manuscripts; 5) based on the outward size and shape of the manuscripts, as maxi-manuscripts, mini-manuscripts, coiled-manuscripts 6) based on the content of the manuscripts, as literary manuscripts, astrological manuscripts, medical manuscripts, document manuscripts.

Manuscript conservation means protecting manuscripts from deterioration or damage caused by physical, biological and chemical factors, and thus to ensure their longevity of survival. These methods include protection of manuscripts, restoration of damaged and deteriorating manuscripts, and duplicating or recording their content for the benefit of the world

at large. Such methods are basically of two modes: 1) traditional methods, and 2) modern scientific methods. Traditional methods employ naturally available vegetative matter for conservation in every country or region, after considering the compositional properties of the manuscript materials and the climatic conditions prevailing there. Scientific methods involve first study and scientific analysis of the composition of the manuscript material and then undertaking conservation, making use of chemical/synthetic substances of conservation after reckoning with climatic variations prevailing in that country or region. Conservation techniques vary from country to country, according to the nature of the manuscript materials and the climatic conditions prevailing there. Since the maintenance of the manuscripts is climate dependant, following the same techniques irrespective of the regional climatic differences may lead to damage or even loss of manuscripts.

Conservation of manuscripts can be successfully carried out by first ascertaining the nature and composition of the material of the manuscript, its characteristics, and the scripting methods employed in the creation of the manuscript, and identifying the causative factors that contributed to their deterioration. The chief cause of manuscripts' deterioration is the variations in climatic conditions prevailing in the area. In a tropical country like India, manuscripts are affected by seasonal fluctuations in climatic temperature. It therefore becomes essential to undertake conservation of manuscripts by taking into consideration the fluctuations in weather prevailing in that particular region.

Ever since man became civilized, preservation of manuscripts has been taking place. The common term in English

used to denote preservation of manuscripts is 'Conservation'. "Conservation" denotes a two-fold action: 1) Preservation or Preventive Conservation, 2) Restoration or Curative Conservation. Preventive conservation means maintaining a manuscript in its present condition by protecting it from further deterioration/damage that is bound to occur, caused by its internal materials or by external materials and by other contributory factors. Internal materials are the composition of materials such as lignin, chlorophyll and naturally present juices, while external materials are preservatives till then applied. Other contributory factors are dust, fungus, insects, light, heat, air pollution caused by industrial dust, chemical smoke from vehicles etc. Preventive conservation procedures refer to undoing the damage caused by the factors mentioned above, and curative conservation means to bring the manuscripts back to their original condition or as near to it as possible. These manuscripts, which are veritable repositories of our history, got vandalized by climatic vagaries and social and religious strife. Those that have survived these onslaughts are today kept in manuscript libraries, research libraries, private residences, universities, and in the homes of medical and astrological experts. The forthcoming chapters discuss preparation of palm leaf and paper manuscripts, factors of deterioration, and preservation techniques.



CHAPTER I

WRITING MATERIALS

The earliest written records of mankind's experiences and thoughts were on rock surfaces. Later soft materials of vegetative matter and animal skins had been employed. Seeing naturally formed scars, marks and other imprints on leaves these vegetative materials were selected for writing upon. They include wooden plank, tree bark, bamboo stripes, Palmyra leaf, sheets made from the pith of a reed named papyrus and cloth fabric. Likewise, animal skin, the inner layer of the skin of animals known as parchment, the skin of calves known as vellum, conch shells, sea shells, tortoise shells, strong bones of animals, elephants' tusks were also among the writing surfaces used.

The choice of any of these materials largely depended on their easy availability in that region, viz. papyrus in Egypt, clay tablets in Babylon, parchment and vellum in Arabia, Palmyra found in South India and East Asian countries, the bark of the birch tree in northern India, bamboo splint in Japan and Korea, wooden plank in Tibet, silk in china were used widely. As far as India was concerned, materials predominantly used were – stone, metal plates, tree bark, wooden plank, cloth, frond of palmyra tree and in later times, paper.

Stone and Clay Tablets

Though early man made use of various materials for writing, his very first writings were on stone and bricks (*Curiosities*

Literature 352). Since he had been a hill or cave dweller and had known only the use of stone, he had drawn patterns and symbols on rocks and cave walls by scraping on them with stone and with coloured juices of raw leaves. Using these techniques, he then inscribed pictures and letters on them. Such literary and historical messages, more than 4000 years old, are still to be found in the cemeteries and temples of Egypt (Gaur 5). Sayee, the archaeologist says that the Acadian Inscription, considered to be the earliest known rock-cut inscription, is earlier than 3000 BCE (*Alphabet* 321). In India, rock-cut inscriptions are available only from 4th century BCE, that is, from the period of Emperor Ashoka.

The Tamil word, ‘*ezhuthu*’ meaning ‘alphabetic letter’ is found in stone inscriptions in the archaeological excavations at Arachalur in Erode district, which is estimated to belong to 3rd century BCE. From this, it can be inferred that stone inscriptions of texts in Tamil Nadu date back to 3rd century BCE onwards.

The most notable stone inscriptions of Tamil Nadu carry information on the temple’s history, battle events during kings’ rulership, grants and endowments made by rulers. A few exceptions are those found in the temple of *Tiruvadaivayil* carrying the *Tevaram* verses of Saiva Saint Gnanasambandar and the Grantha script of Kudumiyan malai inscriptions carrying musical notations. Copying and publishing of inscriptions for perpetuation is also undertaken by the archaeological departments of the respective state governments, faculties of history and archaeology in universities and other historical forums.

Metal Sheets

Gold sheets : In olden days metal sheets made of gold, silver, copper, lead and iron which are stable and strong like stone, at the same time light and easy to carry as well, were

used. Gold being expensive and rare, gold leaves were used for inscription of very important documents, such as agreements made by kings between kingdoms. Two gold sheets containing Buddhist religious tenets in Myanmar belonging to 5th century CE, and twenty palm-leaf shaped gold sheets of 6th century CE in one of the South Indian scripts have been unearthed in archaeological excavations (Sivaganesha Murthy 39). A roll of gold-leaf with inscriptions of Malayalam alphabet is preserved in the British Museum (Sivaganesha Murthy 39). The use of gold-sheet inscriptions in the Tamil country is confirmed by the lines in the Tamil work *Seevaka chintamani* (verse 369), where the practice of writing with a gold stylus on a gold leaf is mentioned. We come to know of an agreement in 1620 CE drawn between Raghunatha Nayak, the King of Thanjavur and the King of Denmark through a gold sheet inscription that is presently preserved in the Royal Archives in Copenhagen.

Silver Sheets: Like gold sheets, silver sheets have been sparingly used. One reason for the limited use of silver is that these sheets corrode in the presence of gaseous chemical residues present in the ambient atmosphere. The pillars in Taxila, near Rawalpindi, is said to have carried inscriptions on silver plates (Sivaganesha Murthy 40). In our own times we find the use of silver sheet in India for inscribing patterns of the Sri Chakra. The Jains have preserved their sacred tenets on silver sheet inscriptions.

Copper Plates: World over various archives and museums have collections of copper plate inscriptions of documents and historical notes. Copper plates prior to Emperor Ashoka's times have been discovered. The Sirivihara Plates belonging to 46 BCE are of immense significance (Sivaganesha Murthy 38). In South India, copper plates carrying significant historical information are preserved in the Government Museum at

Chennai. Likewise, copper plates were mostly used in South India for recording donations, deeds etc.

Lead sheets: Countries in the West have widely made use of lead sheets. In Europe it was the custom to inscribe on lead sheets and keep them rolled as cylinders. The entire writings of the Greek poet Hesiod are known to have been inscribed and kept rolled in lead foils (*Curiosities Literature* 353).

Iron sheets: Iron rusts and decays easily in the presence of oxygen in the atmosphere. Because of this, though the use of iron sheet for inscriptions was prevalent, only few of them are available today. Of them, two important ones are the inscriptions at Mehrauli near Delhi carved on iron pillars, the writings of 405 CE of King Chandragupta and the 15th century CE inscriptions on the iron pillars of Akhilandeswar Temple in Mount Abu (Sivaganesha Murthy 41).

Papyrus

In Egypt, a sheet made of plant material known as papyrus was used as a writing surface. Papyrus is a marsh plant flourishing on the shores of the River Nile. The outer skin of this plant is first peeled off and the inner stem then cut into short pieces of even length which are then split into thin slices. The slices are then closely arranged alternately in longitudinal and transverse segments and then kept pressed. The sticky sap present in the stem makes the layers adhere into a thick sheet. Fine soil from the Nile bed is then smeared over the sheet. The pores present in the stem absorb this soil. Next, the sheet is dried and is then rubbed upon with conch or rubbing stone which renders the surface smooth. Writings were done on them with a pen made of the stem of reeds by dipping them in ink. Such writings on a number of “pages” are joined and kept either as a roll or in a pack. The use of papyrus as writing material was

prevalent in Egypt. The earliest surviving papyrus manuscript is over 5000 years old (Brookfield 20).

Parchment

A king of Asia Minor, who wanted to set up a library, approached the king of Egypt for the import of papyrus. When the latter refused, the Asia Minor king found an alternative writing surface in animal skin. Because animal hides are tough, they were softened by liming and the soft inner membrane of skin was peeled, cleaned and fixed on square wooden frames and left to dry. They were then rubbed on with smoothening stone and rendered smooth. This material is called parchment. It was flexible and could be bent like hand-made paper, and easy to write upon with ink. These manuscripts resemble handmade paper manuscripts. Several “books” of parchment are seen even today in the museums and libraries in the West. Like parchment, the skins of less than 6-month old calves are smoothened and used for writing important sacred texts. This kind of skin is called vellum. We find sacred texts of Islam with illustrations and decorative colour designs inscribed on vellum.

Birch bark

Like metal, papyrus and animal skin, barks of trees too have been used for writing. All over the world various types of barks were used. In India, the bark of the birch tree in northern parts of India and that of agar tree in Assam have been used. The birch bark is obtained from the birch tree which is found growing at altitudes of more than 14000 feet in the Himalayan ranges. Its bark is multi-layered, which is separated, and the inner layer taken out and cut to required thickness and dimensions. Its outer surface is smoothened by rubbing with soft stone or conch shell and then written upon with ink. The ink was prepared by soaking the conch in cow’s urine, and then

burnt. The burnt cinder was then mixed with acacia gum and water (Agrawal 13). The use of birch bark as writing surface has been recorded in the notes of Curtis who came with Alexander when the latter marched to invade India (Katre 5).

These bark manuscripts were bound together between wooden planks for safe keeping. The earliest of these bark manuscripts belong to the 2nd century CE, discovered in Khotan in present day China. A good number of these manuscripts, sacred books of Buddhism, are in the Bower and Godfrey private collections of London (Burnell 68). The oldest manuscripts in the Bower Collection belong to the year 425 CE. Birch bark manuscripts are found preserved in Bhandarkar Oriental Manuscript Library in Pune, and in certain other libraries of North India and Kashmir.

Agar barks (Sanchipat Manuscripts):

Lengths of bark measuring 75 to 90 centimetres are cut out from Agar trees (*Aquilaria Agullocha*), which are more than fifteen years old. They are then dried under sunlight and then left exposed to night dew. The outer layers are peeled off and discarded, while the inner side with desired number of plies is rubbed smooth and written upon with ink. These manuscripts are light yellow, which undergo a change of colour with the passage of time until they turn into the colour of wooden planks. In certain regions, the barks were smeared with turmeric, dried under the sun, and burnished with conch or smoothening stone and thus polished before writing on their surface. The manuscripts have been safeguarded by using the same tree planks as frames. Agar barks have been used in Assam, Tripura and Meghalaya regions. Agar bark manuscripts are called Sanchipat manuscripts.

Various kinds of inks have been used to write Sanchipat manuscripts. Of these the Sanchi ink was used predominantly. This ink is prepared by soaking the silica (*Terminala Citrina*) fruit in a freshly baked clay pot filled with water. The pot would then be placed on a vessel of very smooth surface and kept exposed to night dew. The action of the dew would make the fruit's juice sweat out of the clay pot. This extract was taken and mixed with ferrous sulphate and thus made into writing ink. In some parts the blood of the fish called kumchia or cow's urine is mixed into the silica fruit juice. Though the odour emanating from agar barks kept insect attacks at bay, these manuscripts have been mostly destroyed by the ravages of time. However, Sanchipat manuscripts created after the 16th century CE are kept preserved in many libraries of North India and some libraries in other countries.

Wooden Planks

Writings on wooden planks were called '*phalaka*.' They are found to be used largely for inscribing Buddhist religious texts. These planks are from wood which are easy to work upon, largely available and insect resistant by nature. Sandal wood was used by school children for writing upon. It is mentioned in *Lalitvistara* that Gautama Buddha used sandal wood plank to write on when he was a young boy (Sivaganesha Murthy 47). Wooden plank inscriptions are made in three ways:

1. Books meant for permanent storing are inscribed with a chisel on wooden boards of uniform dimension. These kinds of manuscripts are there in Tibet, Korea, and China. Even today one can find in a Buddhist library in Bhutan, having manuscripts inscribed on uniform sized planks.
2. Writings made with charcoal or lime stone.

3. Molten wax applied on planks and then inscriptions made with sharp pins on wax. This kind of writing is described in ancient texts like *Vinaya Pitaka* and Buddhist *Jataka*

Wooden board manuscripts belonging to Assam region are now found preserved in the Bodleian Library of Oxford University (Katre 5). In Korea it had been the practice to keep the wood immersed in sea water for three years before using them as writing planks. The salt thus absorbed in wood prevents ravaging by insects. Here the thirteenth century texts of *Tripitaka Koreana*, planks are still found in good condition (Sivaganesha Murthy 48). In Western nations wooden manuscripts have not only been preserved by properly stacking them but also cedar wood oil was applied to ward off insect ravages. In certain areas, manuscripts were inscribed in cedar wood itself to safeguard them from insect attacks (*Curiosities Literature* 256).

Bamboo Splints

Bamboo splints have also been in use as writing material, and these manuscripts were called ‘*salaka*.’ They are however very rare in India and are found preserved largely in the libraries of China, Japan and South Korea. A manuscript made of thirty bamboo strips, belonging to 59 CE, records how to prepare almanacs. It was brought to light by the archaeological excavations conducted by Sir Aurel Stein in the beginning of the twentieth century (Gaur 9). A Ramayana manuscript, belonging to very old times, was discovered in one of the villages of Tripura. It is made of very thin strips, finally smoothened, and written with ink by members of the hill tribes of that region (*MBLD News* 6).

Cloth

In some parts of India, silk and cotton cloths have been used for writing. These cloth manuscripts were called ‘*pata*,’

‘*patika*,’ or ‘*karpasikapata*’. Mention of very early use of cloth manuscripts are found on the stone inscriptions of Nasik, Maharashtra (Sivaganesha Murthy 46). The Jains were the early users of cloth writings. The earliest available cloth manuscript happens to be the one written in 1351 CE kept in a Jain library at a place called Patan in Gujarat State. The Western scholar Buhler mentions that the scriptures of the Jain religion were written with ink on silk cloth. Even today, in many Jain monasteries and temples, we find cloth manuscripts being preserved. It was also the practice among traders of the Mysore region to enter their daily accounts in note books made of cloth. Daily accounts were written on even-sized cloth coated with lamp soot mixed with gum from tamarind seeds. After the surface dried writings were made with lumps of lime. These manuscripts are called ‘*Kadatha*’. Several such manuscripts are preserved in museums and Sringeri mutt in Karnataka. Cloth was used for drawing field maps too. Boiled wheat or rice glue paste was applied on cloth and then the surface polished by smoothening with stones, and maps drawn upon them. They are found in many document repositories.

In India, though various kinds of materials had been used for writing, the continuance of these writing materials became rarer, because of the nature of the material, difficulties in preparation and handling, for example *kadatha* and bamboo. But one common factor underlying the choice of every one of them was the longevity of their life. Today, the very word ‘manuscript’ is restricted in its meaning to refer to palm-leaf or paper manuscripts. Therefore, the following chapters deal with a detailed description of the preparation of palm leaf and paper manuscripts, factors that cause damage to them, and conservation of manuscripts.



CHAPTER II

PALM LEAF MANUSCRIPTS PREPARATION

The fronds of palm trees were used as writing material because palm trees grew abundantly in India and South Asian countries. Palm leaves were the cheapest and the most easily available material for writing. If well treated and carefully maintained, they have a reasonably long life and high durability. However as India and South Asian Countries are in the tropical region, the hot and humid climate conditions have an adverse effect on the durability of palm-leaves. Normally it is very difficult to preserve palm-leaf manuscripts for more than 500 years unless we have a good storage system with climatic control and proper handling system.

Tamil language's earliest grammar work "*Tholkappiyam*" is said to belong to 8th or 7th century BCE. More literary works are available from 1st century CE. Survival of this early literature is because of palm leaves. Many evidence and stories are available about usage of palm leaves for religious and other social purposes.

Various Words in Tamil that Denote Manuscripts

The word, *volai*, which literally means 'palm-leaf', has metonymically come to refer to manuscripts incised on palm-leaves. People in the past had used the term '*suvadi*' to refer to palm leaves on which they made alphabetic impressions. In the past preparation of palm-leaves for writing purposes was known as '*suvadi saerthal*' (meaning: preparation and collection

of impressions) and referred to writing on palm leaves as '*suvadi ezhudhuthal*' (meaning: writing of manuscripts).

In the olden days, the word '*aedu*' (literally means leaf or page) was used to refer to palm leaves, both to those on which something has been written or those blank leaves intended for writing purposes. Likewise, a collection of palm-leaf writings was called '*volai putthagam*' [meaning 'a book of leaves'] and '*yaettu puththagam*' [meaning 'a volume of sheets']. The Tamil word '*putthagam*' for 'book' is a corrupt derivative of '*poththagam*'. '*Poththuthal*' literally means 'gathering together.'

Thookku is a support wooden plank suspended from ropes on its four corners which was in use for the safekeeping and safe handling of manuscripts. This contrivance was called *thookku* [literally means 'sling']. It was used both to suspend manuscripts safely at home and to carry them from place to place without getting them crushed. In the homes of wealthy families, porter boys were employed to carry these "slings" of their school-going children. Such porter attendants were known as '*thooku-thooki*' [literally, 'carrier of slings'].

This is the most common Tamil word used to denote a book. We see literary evidences of it having been used in the past during the *Sangam* period. In the past, a '*putthagam*' was also called a '*poththagam*' [lit. repository]. The name was rightly given as '*putthagam*' because books were repositories of thoughts and knowledge.

Palm Leaf

Palm leaf was most widely used for writing in India. Plant leaves are called '*patra*' in Sanskrit and Hindi. If we study of the use of the word '*patra*' and the use of names and shapes of

metal plates, wooden planks etc. we may say that palm-leaf is the oldest material used. For instance, wooden splints are found cut to the size of palm leaves, holes made and written upon, all as done in palm leaves. A Taxila copper plate of 1st century CE had been made in the shape of a palm leaf. We can say with certainty that the use of palm leaves is of greater antiquity. Scholars observe that Buddhist horoscopes were inscribed on palm leaves during 5th century CE and that the practice of writing on palm leaves originated in South India and spread to other countries (Burnell 60).

The earliest available Indian palm-leaf manuscript belongs to 2nd century CE. It contains the text of a Sanskrit play and is heavily damaged. In Japan, palm-leaf manuscripts of the 5th century CE, in the Nepal royal court manuscripts of the 7th century and in Cambridge University, that of 9th century CE are preserved (Agrawal 24). Between 629 and 645 CE, Chinese travelers who had come to India recorded the use of palm-leaf manuscripts. The Persian visitor to India Alberuni, who came during 1030 CE, has also recorded it. Though the existence of palm-leaf manuscripts in India is known to date back to 10th century BCE, manuscripts available mostly are of post-16th century CE origin. Some libraries claim great antiquity to the palm leaves in their collection, but their antiquity cannot be authenticated because of the damaged condition of their first and last pages that carry their date of inscription.

Palm leaves have a life span of more than five hundred years. They are available in plenty everywhere in South India. Very voluminous texts can be contained in a single pack. They are light and easy to carry from place to place. In localities with a great number of palmyra trees palm-leaf blank sheets were prepared and sold. Villages and towns having palmyra

trees in large numbers were named Panaiyur, Panai-marathu-patti, Olaiyur, Olai-palayam etc. [*panai*=palmyra, *olai*= palm leaf, in Tamil]. In his book *Siva TattuvaChintamani*, its author Srilakkanna Dhandesan mentions the practice of processing and sale of palm leaves ready for writing.

Different Species of Palm Trees,

Among the several species of palm tree only the fronds of certain species have been used for writing. A survey of all the existing palm-leaf manuscripts reveals that by and large they belong to three specific species. They are:

1. Talipot palm (Corypha Umbraculifera Linn)
2. Palmyra palm (Borassus Flabellifer Linn)
3. Lontar palm (Corypha Utan)

Besides these, certain species of palm growing in Myanmar and Sri Lanka have been used. Their palms vary in size and quality from the Indian palm leaf.

Talipot palm: This is known under various native names viz *seethala panai*, *koondhal panai*, *taali panai*, *taala patra*, *kudai panai* etc. In the beginning, leaves of these species alone were largely used for writing upon (*India's Past* 80). Since this species grows only in soil with good water availability these trees are found in Tamil Nadu by riversides and in farm lands, on the sea shores of Kerala, Sri Lanka and Malaysia. Most of the manuscripts of this palm variety, preserved in libraries, are texts of great epics, Sanskrit literary and grammar texts.

Talipot palms grow up to fifty to sixty feet. Their fronds are pliable and very flexible. Each fold of the frond forming a writing “page” is 2 to 3 feet long and 3 to 4 inches wide. These leaves are thinner than that of the common palm. For this reason

writings made on Talipot palms are not very clear and legible. When these trees mature they flower once and then the tree dies. Shoots of young trees would then sprout around the dead parent tree. Botanists have determined the life of the *Talipot* to be around seventy years (Agrawal 80).

Palmyra (the common palm tree): This species is found commonly growing in Southern India. They thrive on all terrains—fertile, irrigated land, drought-stricken terrain, elevated regions or sandy soil. Their leaves measure 1.5 to 2.5 inches in width, and 2 to 3 feet in length. The leaves are thick but very flexible. The dimension of the leaves varies according to soil condition and water availability to the tree.

Lontar: Lontar palm trees are found growing in Myanmar, Thailand and other South Asian countries. Their fronds are long and broad like the Talipot palm leaves and thick like the common palmyra. They were written upon either by stylus or with ink by brush after applying lacquer on their surface. These manuscripts have been beautified by red coloured borders and by laying gold strands on them. Such ornamentations also help in sealing the microscopic pores on the leaves, and thus prevent absorption of moisture by the leaves. Such types of palm-leaf manuscripts are found in some manuscript libraries and museums in India.

Texture of the Palmyra Leaf

The palmyra leaf is three layered. The upper and lower layers of epidermis are soft. The middle layer between the two (mesophyll) is made up of fine veins. These veins appear plaited. The chlorophyll found in the gaps between the network of veins, and the lignin, is evenly covered over by a thin, glass-like fibrous

strand. This network of veins prevents small tears on the leaf from splitting all the way (Samuel 56).

Preparation Process of Palm-leaf Blanks

The matured fronds at the bottom of the palmyra tree crown become stiff and lose their fibrous nature, whereas the tender ones at the top of the crown are not firm enough, so fronds that are just six months old alone are first selected. They are dried under shade after which their narrow bottom and top ends are chopped off. The veins are also torn off and then the leaves cut to uniform size.

After thus separating each “leaf” from the frond, their surface is rubbed with smooth stone or conch to make the fluid substance of chlorophyll spread evenly all over its surface. In Sri Lanka, cylindrical rollers have been used to smoothen and shine the palm-leaf surface. A pack of leaves prepared in this manner are bound between two wooden planks and trimmed to exactly even dimensions. This process is known as leaf trimming (*olai narukkuthal*). The corners are rounded lest the leaves begin to split at the tips. After this trimming and piercing of holes, the borders would be trimmed to size all around. Generally, for incising literary texts and writing other books, palm leaves with veins removed and of perfectly even dimension have been used, while for incising documents and deeds, full-length leaves have been used with or without removal of vein. Unwritten blank palm leaves are called ‘*vellolai*’ (blank leaf). In Sinhalese language such bundles of unwritten “stationery” are called ‘*puhupot*’ (Piyadasa 22).

This process of preparation of leaves is called *olai vaarudhal* (leaf gathering). Male palm trees, which do not bear fruit, were selected for harvesting their leaves. Such trees were called *volai vettupanai*. Separated or de-veined palm leaves

were called *olai chiragu*. The knives used for cutting them were called *olai vaari*. A stone inscription on the Alutvava Pillar in Sri Lanka mentions that palm trees were cultivated exclusively for their produce of leaves for writing purpose (Piyadasa 22).

To bind together a number of uniform sized leaves, a hole is made in the centre if the leaf is short or in its left side if it is short. Two holes are made, if the leaves are either too long or too voluminous. It has been found that holes are made after dividing the total length of the leaf into seven equal parts and the holes were made after two parts from left and right ends. This ratio was discovered after a sample survey of a hundred manuscript leaves in the Sarasvati Mahal Library holdings. Thus, we know that there was a fixed pattern in piercing holes. In Orissa, it has been the practice to make only one hole, at the centre.

In Sri Lanka palm leaves trimmed to an even size were bundled together and then pierced through. Iron spikes were used for boring the holes. Before making the punctures, the top-most blank leaf was folded into three equal lengths, then straightened and then again folded four-fold and straightened. Then holes were made between the two folds both on the left and the right sides. Strings are passed through the holes in the left side to secure and bind the pierced leaves. Leaf edges are fine-trimmed by scorching them along their edges with red-hot iron. Libraries are said to have employed workers exclusively to carry out this job (Subramaniam 39).

Methods of Writing on Palm Leaf

Two types of inscribing techniques were adopted — incising and surface writing. Incising mode made use of a sharp stylus to scratch the alphabets on the leaf. This is a very old technique, which is revealed by the legend that the ancient epic

Mahabharata was etched by Lord Ganesa, as “Scriber,” with a stylus on palm leaf, while Sage Vyasa was dictating it. This mode of inscription was employed in the southern parts of India, in Orissa, Sri Lanka, Thailand, Myanmar and other far Eastern nations whose alphabets were curved and roundish. This mode of inscription by stylus is said to have originated in South India (Burnell 60).

The other mode of writing with ink is the process of touching with ink on the leaf surface by a brush or a thin twig of reed or the quill of a bird. The languages of northern India have alphabets which are mostly of straight lines; their writings were made by dipping the pen in ink. If straight lines are made by incising with a stylus, they would split and tear the leaf apart so ink was used instead. In northern India, in addition to writing with ink on birch bark, ink writings had been made on palm leaves as well. Such palm leaves are found preserved in several museums in North India. In Buddhist manuscripts, we see not only black ink, but also inks of various other colours used for beautification and for drawing pictures. In documents of special importance, lacquer mixed with coloured dyes were applied on the blank surface of palm leaves and then written upon with different coloured inks. Such Buddhist manuscripts are found in notable museums the world over.

Preparing the Leaf

Blank leaves must be specially processed prior to using them for inscriptions. Only then it becomes possible to incise characters on them with the stylus. Scratching with the stylus on raw leaf damages them. The method of processing of blank leaves varies from region to region, and country to country. The major methods are enumerated below:

1. Softening leaves by cooking them in steam.
2. Treating them by stuffing them into stacks of paddy straw that is not totally dry – when moist straw is heaped up it produces heat.
3. Treating them for an hour or two in hot water or hot milk.
4. Applying sesame oil on the leaves.
5. Burying them in wet sand or soil.
6. Burying them first under wet soil, taking them out, cleaning them and then keeping them buried in paddy grains stored in bins.
7. Cooking them for half an hour to one hour in turmeric water solution or water obtained from cooked rice gruel (This technique was followed in Orissa for urgent requirement of writing leaves).
8. In Thailand, leaves cut to size were packed in wooden frames in packs of fifty and then cooked for twenty-four hours inside special kilns. Not only does the heat in the kiln soften the leaves but it also expelled certain fluids in the leaves that cause rigidity. As a result, leaves turn pliable and bend easily (Agrawal 27)
9. Leaves cut out from the fronds were piled one on top of another and exposed to moderate heat for three to four hours. Sometimes they were cooked along with pine apple leaves. This treatment was believed to increase the life of the leaves by preventing disintegration caused while ageing. This treatment is followed by exposing the cooked leaves in night dew for three nights, which makes the top side smooth and soft, easy to write upon.

Writing Styluses

Ezhuthani is the stylus used for writing on leaves by superficial incision. They are made of gold, brass, copper, iron, ivory or bone. These materials are very rigid and can maintain

their tips sharp for a long duration. Based on their shapes styluses are denoted under the names *Madak-kezhuthani* (foldable stylus), *Gund-ezuthani* (stylus weighted by a tapering shape), and *vaar-ezhuthani* (stylus with a knife at the other end for trimming the leaf) (Swaminatha Iyer, *Nallurai Kovai* 44)

Madak-ezhuthani are those provided with handles made of wood or ivory. One end of it has a foldable stylus and the other end, a foldable knife. It is compact and was kept by scribes while on travel. Today such an implement without a stylus is called a pen knife.

Gund-ezhuthani has a fat and round top end which tapers down to a slender bottom portion. It is quite short and used largely for training in writing practice. It creates large-sized characters.

Var-ezhuthani has a sharp stylus at one end and a trimming knife at the other. It was the most prevalent type of stylus used. It was kept sheathed in a palm-leaf pouch.

Even sharp thorns had been used as a stylus in the olden days. This is evidenced by a historical report. The 18th century ruler of Sivaganga, Marudupandiar, was on one occasion provided with food by a few old women while he was walking under disguise. In return of their hospitality he wanted to help them and wanted to send a written order to his court officials in the royal court in Sivaganga. In the absence of any writing instrument he is said to have made use of a thorn from the thatched roof of his host's hutment (Swaminatha Iyer *Naan Kandathum Kettathum* 84). In Sri Lanka, different kinds of writing styluses were used depending on the types of scribes using them (Piyadasa 22). The use of stylus for writing on palm leaves is mentioned in the Tamil epics *Silappadhikaram* and

Seevakachintamani. In Sanskrit, the stylus used for writing was called *lekhani* [meaning ‘writing instrument’]. Later on, all writing instruments such as the pencil, pen, brush and stubs of reed came to be called *lekhani*.

Quality of Impression

It was the custom to draw a sample circle with a straight line in the shape of Tamil letter ‘உ’ on the right-hand corner of a palm leaf to assess whether it had been conditioned adequately to receive impressions. This testing was known as *padam-parthal* (testing its suitability for writing). If the circling could be made easily then they would start writing the text. If the stylus got stuck the leaf would once again be treated. It was this practice which later became established as the auspicious *pillaiyar chuzhi* (‘Vinayak mark’), which is even today drawn before commencing any writing (Subramaniam 37). Writing was done in the olden days without the individual letters touching one another and without the line going into a crosswise slant. Very fine styluses had been in use with which minute characters of thirty to forty lines written on a leaf. Different techniques of inscribing were adopted from place to place.

In Tamil country, scribes held the leaf with their left hand and the stylus with the right at the time of writing. They would first make a small ‘V’ shaped groove on the left thumb nail which is grown long, rest the stylus in the groove and then start writing (Swaminatha Iyer, *Nalluraikkovai* 145). This habit of supporting the pen with the left hand while writing with the right continues even today in Kerala. In certain areas inscribing was done single-handedly, without support of the left thumb, like writing on paper. This practice is in use even now in Raghurajpur of Orissa and in Sri Lanka.

Inking of Incised Leaves [*Maiyadal*]

To make the incised characters on palm leaf clearly visible, ink was applied all over the page. This practice was called *maiyaadal* (inking). In sacred texts (the *Ramayana*, *Mahabharata*, *Thevaram* and *Naalayira Divya Prabandam*) preserved for worship in prayer rooms turmeric or sweet flag [*Accorus Columus*] was ground into a paste and applied. For the other volumes kept for reading, *kovai* leaf [*Cocina indica*], or datura leaf juice was mixed with the ashes of the mango leaf, *dharbai* grass (halfa grass, *kusa* in Hindi), ash or lamp soot obtained by burning a lamp of castor oil. The application of this “ink” made the letters stand out in contrast while protecting the leaves from insect attacks. This was done in the olden days once a year and the event were called *maiyaadal* (blackening) festival. (Swaminatha Iyer, *Naan Kandathum Kettathum* 84). The practice of turmeric application finds mention in *SeevakaChintamani* and *Tamizhviduthoodhu* (Swaminatha Iyer, *Nalluraikkovai* 135)

Colouring of Incised Pictures

Pictures were incised on palm leaves and colour was then added to these pictures. The practice of depicting literary stories as pictures on palm leaves exists even today. An entire village, Raghurajpur (5 kilometres from Puri on the Bhuvaneswar-Puri Road), dedicates itself to this profession. Its people primarily engage themselves in drawing pictures rather than writing texts on palm leaf. Stories from legends and epics are the subjects depicted. To draw larger pictures two or more palm leaves are first joined and then drawn upon. Some pictures are coloured after the drawing is completed. Pictorial manuscripts are of Orissa origin, by and large. In Tamil Nadu some hill tribes of Dindigul district are said to create pictorial palm leaves and

sell them for a living. These facts show that the practice of depicting pictures on palm leaves was prevalent till recent times.

Methods of Binding

For ease of use and for safe-keeping, palm-leaf manuscripts were tied up with strings and secured together. Here too, different techniques were adopted, depending on the dimensions of the leaves and their bulk. On double-holed manuscripts, torsion-less cotton or silk string was passed through the hole on the left to secure the bundle. To one end of the thread is attached a double folded palm leaf with its spinal vein, cut into the shape of a parrot beak (Swaminatha Iyer, *En Charitham* 55). Buttons or copper coins with hollow centres or shells were also used. If a volume contains a large number of “pages,” the leaves tend to bend downwards due to their weight while reading. While the leaves remain thus suspended on strings their ear holes rub against the strings and get damaged or become large. To overcome this problem, volumes exceeding 50 leaves were provided with a pin instead of string, made of slim bamboo twig or iron or copper rod. This thin stick was called *naaraasam* in Tamil (Swaminatha Iyer, *Nalluraikkovai* 142). Also some blank leaves were added and secured before the beginning and after the end of the written text, like the fly leaves of printed book today.

Volumes of certain importance were provided with engraved copper or brass plate binders or of ivory. Bamboo splints, teak reapers and neem-wood planks too were used for this purpose. On epics and literary masterpieces these frames were decorated with illustrations and coloured. In several volumes of Jain religious works, these bindings carried portraits of *Tirtankaras* or of Sruta Devi. A manuscript collected in 1999 by the Archaeological Department, Tamil Nadu Government

from a Jain monastery in Chittamoor village near Villupuram town, has an interesting illustration on its binding board. It depicts a monk sitting alone and four other monks sitting together in *padmasana* posture and picking up a leaf from a bundle of manuscripts placed on the *Saraswati Peetam* ('X' shaped book-support plank). Behind them is depicted suspended plank for storing volumes of manuscripts, a *thookku* which is also called *asai*.

In the manuscript section of Orissa State Museum in Bhubaneswar, manuscripts are secured by tying them together at both ends and at the centre. In manuscripts libraries of Tamil Nadu diagonally slanting ties, called "diamond tying" are made for even distribution of the pressure of tying up. In Sri Lanka, it has been the practice since olden days that tying was done in a specific manner by means of thin strings. The manner of tying them up is an indication of who the receiver is. By convention, if the epistle manuscript has one round of tying the addressee is a foe, if two rounds it is for a friend, three for a relative, four for a member of one's family, and five if the receiver is one's parents or brothers, and six if addressed to the king (Silva 24).

Palm-leaf sheets are found not only in differing sizes but also in several shapes. Smaller leaves were used to inscribe short texts and those that required frequent carrying in hand. Epics, lengthy literary works and legends were inscribed on broader and longer leaves. In Tamil country, state revenue accounts, temple accounts and information of land holdings were written on untrimmed palm leaves after removing its rib. Most of these temple records have perished. A few surviving ones are being preserved in several institutions. Literary manuscripts are kept as rolls, cylindrical batons, in the shape of *lingams* and like strings of *rudraksha beads*. Leaves have also

been cut into shapes of fish, tortoise, fan, top, crab, parrot etc. and then written upon. Manuscripts in these shapes are displayed in the Museum of the State Government of Orissa at Bhubaneswar. A manuscript volume cut in the image of Goddess Sarasvati was preserved by the family of Melagaram Tirikooda Rasappa Kavirayar in Tamil Nadu.

Season for Palm-Leaf Scripting

Though palm-leaf writing went on all through the year, the activity had been intense during particular seasons of the year. Though literary and learning activity is not time-bound, environment and climatic factors are found to have determined its timing. A survey of the forewords and after-words found in manuscripts reveal the reason for specific months of the year chosen for manuscript writing. In particular, Tamil months *Aavani* to *Kartikai* (August to December), being rainy season in Tamil Nadu, monks and teachers, remaining in one place, engaged themselves in scholarly activities. These months are not suitable for travel, hence the period beginning from the full moon day of the Tamil month of *Aavani* up to *Aippasi* [August to November] is traditionally observed as the *Chatur Masa* - retreat by Brahmin scholars and ascetics. The tradition of worship to Vyasa and reading of the Vedas on the *Aavani* full moon day continues even now (Paramasivam 330).

Social Value of Palm-leaf Manuscripts

In southern India, records of art, literature, religion and history were written and perpetuated, and preserved through palm leaves which also played a major role as a record of social conventions and exchange of information. The spoken words of the king were recorded on palm leaves by a scribe who was known as '*Tirumandira Olai*,' and its chief scribe was given the

title ‘*Tirumandira Olai Nayagam*.’ The recorder of the king’s activities was known as ‘*Pattolai*’ and the account keeper was known as ‘*Olai Kanakkar*.’ The person recording the happenings of the town was called ‘*neetolai*’”. During the Chola reign palm leaves were used for polling purpose and it was called ‘*kudavolai*’.’ Palm leaves on which agreements and loan information was inscribed were called *Aavana olai*. Primary, original manuscripts were called *moolavolai* and their copies *padivolai*. The site of this document repository was called *Aavanakkalari*.

The social use of these “documents” are also found in literary works. A classic case is the *Thaduthatkonda Puranam* chapter of the *Peria Puranam*. It is the story of Lord Siva appearing in the guise of an old Brahmin and stopping the wedding ceremony of Saint Sundarar on the strength of a document drawn by Sundarar’s grandfather pledging his entire lineage of successors to serve as bonded labour. Sundarar, the bridegroom, in a fit of rage, tears up the document calling it preposterous. “The old man,” not losing his composure, says that it is only a copy and that the original document is safely preserved in the document repository.

Palm Leaf Scripts

Languages with curved alphabets were scripted by incising with stylus. These scripts are – Tamil, Granta, Malayalam, Thikalari, Nandinagari, Kannada, Telugu, Oriya, Sinhalese, Burmese, and Thai. Languages whose scripts contain straight lines such as Devanagari are not scratched with stylus because the straight-line incisions tear the palm leaf. However, a few of them have been discovered. In early times dots and stop marks were not made in Tamil scripts, because such marks puncture the leaf. Only Tamil manuscripts written after 1850 CE carry dots and stop marks. In a research article “Script Styles in Tamil Manuscripts” observes the reason for not finding

dots in Tamil scripts through a comparative analysis of *Tolkaappiam* stanza, character styles of palm leaves and the influence of Grantha scripts. His finding is that Tamil consonants in manuscripts written after the 12th century do not carry dots. This was a result of the influence of Granta script of Sanskrit language which has no dots. His reasoning is sound, but the truth of his statement can be confirmed only when manuscripts dating prior to 12th century are discovered.

Palm leaf writings are largely found in the southern parts of India and East Asian nations. Their continuance diminished due to modernization, easier life styles, invasion of native cultures by alien cultures, and easy availability of paper worldwide. In Tamil country, palm-leaf writing was in existence till the beginning of the 20th century. All legal deeds such as donation, sale, property division, and agreements were made on palm leaf till the 19th century. Poets also were in the habit of employing the services of scribes. In the later part of the 20th century, keeping longevity in mind, several books published in paper were later copied on palm leaves (Kovaimani 4). In the Sarasvati Mahal Library, Thanjavur there is a palm-leaf version of a book copied from that published on paper.

Dating of Palm-leaf Manuscripts

One way of fixing the date of inscription of a particular volume is from the details scripted either in the first or the last leaf of a volume. They mention the title of the work, its author's name, the name of the scribe, its time of commencing or completion, whether it is an original or a copy, the date of copy-making and such information. In palm-leaf volumes that have been discovered in the present times, the first and last leaves are mostly found damaged, we are at a loss to obtain information on the manuscripts. We can, however, arrive at their approximate period from the leaf's features, the historical period

to which script style belonged, the style of its language and use of vocabulary. But their exact age cannot be determined by this method. Sometimes a volume would seem recent, less than two hundred years old in its features and style of script. But the date mentioned in its first or last page would be some 400 to 500 years in the past. Such an error creeps in because a copy manuscript made at a later time would carry the date mentioned in the original source instead of the date in which the copy was made. Though libraries today hold thousands of manuscripts, only a few of them contain their date of inscription.

All available manuscripts today, with only few exceptions, are post 11th century, though historical evidence points to the existence of palm-leaf inscriptions earlier to 2nd century BCE (Burnell 3). Several thousands of manuscripts have been lost or destroyed with the passage of time, religious strife, ravages caused by wars between rulers, fascination for the new-fangled leading to neglect of the old-fashioned and so on. So, the last word cannot be had on the age of manuscripts in India. Generally, the age of traditional artefacts is determined by what is known as Carbon-14 dating. But this method is not suited to ascertain the age of palm-leaf manuscripts. The chief reason being, that all leaves of a particular volume may not be from a single tree. Moreover, to obtain enough carbon to conduct dating tests we have to burn up a few leaves, thus losing them permanently. For these reasons C¹⁴ dating tests are not done for arriving at the age of palm-leaf manuscripts. To conclude, circumstantial evidences, like script style, the period of a particular literary work's genesis, evidences of historical events, the times in which the author-poet lived, information on the text furnished in the first and last leaves – such factors are considered for reckoning the a palm leaf manuscripts' age (*Suvadipathipu* 4).

The oldest palm-leaf manuscripts in the collection of Sarasvati Mahal Library, Thanjavur is the Sanskrit work titled *Palavathi*, estimated to belong to the 11th century. Since its first and last leaves are damaged, its date was arrived at from the times in which the author-poet lived, script style, and the quality of the palm leaf. However, it cannot be authenticated. Also these manuscripts carry the name of the Tamil year which gets repeated in 60-year cycles. Sometimes, we arrive at the exact year because of the king's name mentioned and we have historical evidence of the period of that king's rule. In the absence of such extraneous evidence, the date of the manuscripts cannot be declared with certainty.

The importance given to manuscript writing is revealed from several historical paintings and sculpture that depict postures of writing. One such is the sculpture of the 2nd century CE found in the Nagarjuna Hill. In the sculpture the significance of a dream by Maya Devi, the mother of Gautama Buddha is explained to King Suddhodana by three astrologers. Sculpted underneath is the image of a scribe sitting and making a note of the oral interpretation. This sculpture is said to be the oldest image depicting the practice of writing (Robinson 6). Likewise, the palm leaf entitled *Skanda Purana* in Sanskrit language in Prakrit script is the earliest manuscript surviving. It is considered to belong to 2nd century CE.



CHAPTER III

PREPARATION OF PAPER MANUSCRIPTS

Paper manuscripts too, like those of palm leaf, are widely found in India. Use of paper started in India from the 12th century onwards following the Mughal invasion. Ease of writing and preserving led to predominance of the use of paper and decline of the use of other writing materials.

Paper was invented in China in 105 CE. It was invented by Ts'ai Lung who was an officer in the court of King Sung. He was an official of the royal court, the king's advisor and also as an administrator. He then served as Chief of the Imperial Supply Department (Life of Ts'ai Lung, 15) when an acute shortage of writing material necessitated finding of new kinds of writing materials. At that time, while dipping cloth in starch solution, starch solution on cloth fibre was found to create a smooth and flexible material. The material thus formed was found suitable for writing upon, so such starched "paper" was created out of old fishing nets and the inner barks of mulberry stems (Life of Ts'ai Lung 15). The material thus created was offered to the king as a gift in the year 105 CE and this gift was buried along with the king's body.

While historians were conducting a study of old tombs and cemeteries by excavating their sites, some boxes containing materials used in the past were unearthed. One such chest was coated with lacquer on its outer surface, in addition to a coat of certain types of earth. This box contained paper in addition to silk cloth and bamboo splints (Life of Ts'ai Lung 6). Based

on this discovery, it has been accepted that paper was invented in China and the year of this gifting is taken as the year of the invention of paper.

The Chinese kept the process of making paper a closely guarded secret. But with the spread of Chinese culture the method of making paper spread to Korea in 345 CE and later to Japan in 610 CE. The Arabs acquired this technique from Chinese prisoners of war whom they had arrested in the battle of Samarkand during the 8th century. From Arabia the technique reached Baghdad in 900 CE and Morocco in 1000 CE. In the 12th century the technique of paper making went to Spain and France and other countries of the West. The people of England got it in 1454 and Americans in 1690 (Hunter 465).

We come to know of the use of paper in India even before its Chinese invention. Nearchus, a military lieutenant of King Alexander, during their invasion of India in 327 BCE reports of the use of a smooth plate made of cotton as writing surface (Gosavi 44). Professor Gosavi of Handmade Paper Research Institute, Pune, confirms that India is the world's first inventor of the paper (Gosavi 44). A Western scholar on Oriental languages, Dr. Buhler has stated in his book written in 1856 that the likely period of invention of the paper in India would fall between 350 BCE and 100 CE. We learn that in India cotton fibre was the raw material for paper.

Though historical evidence points to the knowledge of paper making in India even 2000 years ago, the use of paper was not prevalent in those times due to religious edicts against use of artificially created material and the general disinclination to use paper for copying holy texts of the *Vedas* and religious scriptures. Even the sparingly used early paper manuscripts have

disappeared, destroyed by the harshness of the Indian weather. So the credit of being the inventor of paper has gone to China. The reintroduction of the use of paper in India was made by the invading Mughal kings in the 12th century. Thereafter, the use of palm leaves and birch barks, the predominant writing material till then, began to decline. In the 19th century, good quality paper was manufactured in Bengal and exported abroad.

Paper is made from naturally available plant fibre. This fibre is a compound of carbon and possesses the property of bending easily. Paper is also easy to carry. Plant fibre is first isolated and obtained. It is then cleaned. After that it is mixed with alum, rosin, gelatine and water in which rice was boiled, all of which have bonding stickiness. These are made into a pulp which is spread and dried to form a flat surface. When the separation of fibre is manually done it is called hand-made paper and when it is done by machines it is called factory-made paper (machine-made-paper). Hand-made paper was made widely during the 19th century in various places. However, machine-made paper can be made faster and in bulk.

Raw Material for Paper Manufacturing

The cellulose fibre for making paper is available from a number of plant sources, which are broadly divided into four categories depending on their fibre content (Cunha 27)

1. Cotton group
2. Bast group
3. Grass group
4. Wood-pulp group

Plant parts contain lignin and gum in addition to the presence of fibre, and so their fibre must be first isolated and obtained. In the process of this isolation, other unwanted substances like lignin, gum etc., present in fibre that reduce its toughness and strength, are separated. Therefore, papers having differing fibre-richness were used for different purposes depending on their fiber content. The foremost among them are paper made from cotton or cloth rags which have 95% fibre, those produced from jute and linen have 75%, those from bamboo, paddy straw, crushed sugarcane have 55% and paper made from wood pulp contains 43 percent. Fibre, which is made up of cellulose, is first separated and obtained from plants and made into a thick fluid. To it is added a solution of bonding substances such as alum or rosin or gelatin or boiled mashed-rice solution. This mixture is then spread on paper-making trays or poured on metal conveyor belt. Paper is obtained when it gets dried. Paper made in this way has good flexibility. When the fibres get interlocked micro pores are formed in the gaps in between. These gaps provide the paper the quality of absorbing ink. If the ink absorption level is high then the paper becomes unfit for writing because of smudging. To keep absorption level of ink low, unbaked lime (calcium carbonate) powder or magnesium oxide powder is added while making paper. These materials are called loading materials. Nowadays, dyes of different colors are added as loading materials. Gelatin paste is added to give smoothness to paper surface. Such paper is obtained both in hand-made and in factory-made production.

In the beginning paper was manually produced. First, fibre is separated from plant material and cooked in boiling water. This fibre is then thrashed with wooden knives to cut the fibre and then cleaned. After that bonding material is added and the pulp prepared. This pulp is then poured on trays made of thin

bamboo twigs till it spreads evenly all over the tray. When the pulp dries it turns into paper.

Hand-made paper is very strong as less of chemicals are used. Moreover, the fibres are all pointing in various directions, whereas in machine-made paper they all point in the same direction, that of the machine. Some manuscripts are specifically written on hand-made paper to ensure their long life. Research institutions have been set up to find ways of enhancing the life of hand-made paper and the methods discovered are applied in hand-made paper making units. Today Japan is in the forefront of production of hand-made paper, their paper being used all over the world. Their paper is made from kozo plant fiber. In the Hand-Made Paper Research Institute of Pune, paper is made using the vegetable *bindi* (okra or lady's finger) juice as sizing materials. Some vegetable is cut into bits and soaked in water and this water containing bonding property is used for making paper. During the times of Maratha ruler Serfoji II in Thanjavur (1798- 1832 CE) manuscripts, records of details of palace events, were written on especially prepared hand-made paper from bamboo. The declining number of hand-made paper manufacturing units in every country led to the decline in use of hand-made paper.

Paper making machine was invented by Nicholas Louis Robert in 1795 CE, in response to the increasing need of paper, with the help of scientific advancements. Various kinds of chemicals are used in machine-made paper production. Paper pulp is subjected to chemical bleaching to obtain pure white paper, which people like. At the same time, coloured chemical dyes were also used to produce papers of different colours. Excessive use of chemicals results in shortened life of machine-made paper.

The basic raw material of paper is the fibre from plants made up of cellulose. Cellulose is a compound of carbon, hydrogen and oxygen. These elements are harmfully affected by using chemicals in paper manufacture, weakening the chemical structure of the cellulose. The fibres in handmade paper are of varied length and so their top surface is uneven. Since paper absorbs atmospheric moisture, it is subject to expansion and contraction.

Good quality paper should possess the following properties:

1. Should be strong.
2. Should have long fibres.
3. Should not have used many chemicals for its manufacture.
4. Should have minimum of loading material
5. Should be without acidity and minimum alkalinity.
6. Should not be chemically bleached.
7. Its cellulose fibre should be of 100 % purity.

Paper possessing these properties has a long life. Its strength is determined by subjecting it to fold-endurance test, its ability to withstand weight, acidity test, opacity etc. Papers that pass these tests have longevity of life.

Writing Inks and Dyes

In the olden days, writing tips were made of bamboo or reed or bird feather. Reed stem was cut to 7 inch length, one end of it was cut tapering down from below the nodal-joint to a sharp point, and this end was slightly split. They were used like pens. Eagle or duck feathers have particularly hard and sharp spines so were used as writing stylus. Dyes of varying colours had been in use for writing on paper, but black ink was

predominantly used. Black ink was called Indian ink in India and Chinese ink in China (Cunha 547) and mostly black ink was used for paper manuscripts. Historical documents were written with gall nut ink.

Indian ink was made out of soot deposited by lamps burnt with castor oil. This carbon deposit was mixed with acacia gum resin and rain water. Ink prepared in this manner does not dissolve immediately even when water drops fall on the manuscripts. However, if moisture remains in the manuscript for some time the letters may smudge.

Gall nut ink was used in creating historical chronicles and epistles to ensure that the letters do not smudge even when they come into contact with water. This ink is prepared by boiling together a mixture of extracted gall nut juice and ferrous sulphate in equal measures and mixed with acacia resin and rain water. If the mixture of gall nut juice and ferrous sulphate is not in the right proportion it would affect the paper on which it is used. Apart from black ink, coloured inks obtained from henna leaves and indigo leaves had also been in use. Even dyes from ochre or red coloured natural stones are known to have been used. One may conclude that, by and large, Indian ink was used for paper manuscripts while documents and diary entries were made with gall nut ink.

Paper manuscripts were written upon separate sheets, as was done with palm leaves, with the pages numbered. Each sheet was provided with sufficient margin space. In some cases, marking lines, headings and key words were written in red ink. Devanagari script is a hanging script, hanging from below a straight line. Before commencing to write in Devanagari script, in a wooden plank, parallel threads were fixed with uniform margins and required line space. Before writing the paper was pressed over the wooden plank. The paper got the line

impression, made writing even and uniform. Such a writing plank used during Maratha period is preserved in the Sarasvati Mahal Library. Most of the paper manuscripts of ancient days have deteriorated with fungus attack due to heavy rains. To prevent fungus attack every alternate sheet or fifth sheet was smeared with turmeric paste before writing.

The title page of some manuscripts carries the picture of its author or a particular deity. In the Rig Veda manuscripts held in the Sarasvati Mahal Library, the title page of each of its sections contains colourful art work, very skillfully drawn, instead of the usual border lines on either side. The sheets of Mughal period paper manuscripts have even been secured by binding. Their pages have been coated with rice starch solution, and then rubbed over to a smooth sheen, on which decorative alphabets and other illustrations have been drawn. Such manuscripts are seen in several libraries of North India. In some of them the binding cover leaves have been slightly projected on one side to protect and cover the opening side of the volume.

Such manuscripts with decorative work were held for safe keeping in temples, palaces, mutts and academics' residences. The reasons for their deterioration, conservation measures and the present-day scenario of manuscripts conservation are dealt with in the following chapters.



CHAPTER IV

CAUSES OF DETERIORATION AND LOSS

All living things on earth as well as non-living materials are subject to decay and destruction as a result of natural disasters, ageing, environmental and other factors. Manuscripts are no exception to such loss. Writing materials may be categorized as inorganic and organic. Inorganic materials do not get damaged as easily as organic materials. Palm-leaf and paper manuscripts, which are of organic substances, deteriorate faster due to several factors. Knowledge of the properties of the materials of writing, materials used in their making and the factors causing their damage, and a sound knowledge of their conservation methods would help in greatly increasing the longevity of the life of manuscripts. It is generally believed that palm leaf manuscripts can be preserved for 500 years and paper manuscripts for 300 years. If they are properly preserved and maintained, they can actually be preserved for thousands of years. So, it is essential that all those responsible for handling of manuscripts possess an awareness of the properties of manuscripts material and factors causing their damage. A sound knowledge of the causes goes a long way in prevention of and protection from damage. Several different factors are responsible for the damage to manuscripts, depending upon their anatomy and the environment to which these are exposed.

Dust

The primary cause of damage to manuscripts is dust. Dust is created by 1) micro dust rising from the earth surface from the ground nearby, and 2) particles from smoke emission and other chemical gases from vehicles and factories. These particles carry oil and chemical substances.

Dust settled on manuscripts and books absorb moisture in the atmosphere which cause colour change and stain on their top surface. Dust containing chemicals weaken the cellulose fibre in the paper or leaf. A layer of dust settled on a text makes the letters of the text dim and invisible. Dust settled on palm-leaf manuscripts which are left untouched and unopened for long periods absorb moisture from the atmosphere and after a period make the leaves stick to one another.

Light

The common source of light is from the sun and from electrical lighting created by filament bulbs, fluorescent bulbs and light emitting diodes. Light is the emission of very minute electromagnetic particles from the source materials. These particles have varying wavelengths. The light rays having a wavelength of less than 400 nanometres and more than 700 nanometres are not visible to the naked eye. Quality of light varies based on the speed and frequency of the light waves emitted from a beam of light. From any source of light, natural or artificial, our eyes can see only lights of specific frequencies. The unit length of light waves is measured in nanometres. As mentioned above, the human eye can see only light rays between 400 to 700 nanometres: The alpha, beta, gamma and X rays - all of which have wavelengths of less than 400 nanometres – get blocked in the sky by the ozone layer in the earth's atmosphere.

The seven colours VIBGYOR in a light beam are each of varying wave length. The ultra-violet rays near violet radiations are of very short wavelength and so are more powerful. These rays falling on paper cause chemical changes in them. The lignin present in paper undergoes change of colour when it comes into contact with these rays of light. The infra-red rays near the red colour in the light ray produce heat on the written surface. This heat leads to a reduction of moisture which causes damage. Damage caused by light occurs not only to the characters imprinted but also to the stability and strength of the paper or leaf. Therefore, the falling of direct light on manuscripts must be avoided. It has been found by research that in a book repository, lights having 50 to 70 Lux intensity cause no harm to stored books (Agrawal13).

Climate

Climate mainly refers to atmospheric moisture and temperature. The climate outside a building is called macro-climate and that prevailing inside is referred to as micro-climate. Organic materials like paper or palm-leaf writings are subject to decay by fluctuations in weather conditions, which are a major cause in this respect. Temperature and relative humidity (RH) are inversely proportional. i.e., increase in temperature results in reduction in RH. Maintaining ambient weather at constant levels is very difficult in tropical countries such as India.

Paper and palm-leaf, being vegetative products, tend to absorb moisture from the atmosphere. They expand by absorbing the high levels of atmospheric moisture during the rainy months and contract by expelling this moisture during the summer months. Such repeated expansion-contraction due to climatic changes, results in a weakening of their structural stability, which in turn, in course of time, end up in damage and deterioration.

Not only strength, but also flexibility is lost by the expansion-contraction cycles. They also get wrinkles and their edges crack. A prolonged retention of moisture absorbed in the rainy season also weakens the fibrous texture of the manuscripts.

Warm and humid atmosphere also encourage fungal growth, which also contributes to the damage of manuscripts. At certain levels of temperature and moisture, micro-organisms floating in the air get deposited on manuscripts and begin to grow as fungi. Fungus roots penetrate through the leaf surface and insects are attracted by the filthy odour of fungi. Fungi attract insects that feed on them and these results in damage to manuscripts. These insects eat not only the fungi but also the soft fibre of the palm leaves. Insects lay eggs on the leaf surface and the larvae emerging from the eggs penetrate and make holes in the leaves. These damages can be prevented by maintaining a constant level — 20 to 22°C of temperature and 50% to 60% RH – in rooms where manuscripts are stored.

Specific temperature and humidity can be maintained through controlled air-conditioning but it must operate 24 hours a day. Air conditioning turned on only during working hours of the day results in variations of temperature and humidity that in turn promote growth of fungi leading to damages to manuscripts. If the manuscripts are moist, letters written on them in ink dissolve and fade away, besides creating stains of the deposited dust. A number of private manuscript collections in south India do not consider the problem of fluctuations of weather. This neglect is a chief cause of deterioration in their collections.

Water

Fluctuating levels of humidity in the atmospheric air lead to proportionate variations of moisture in manuscripts causing

deterioration of manuscripts. Excessive rains and flooding in libraries also result in manuscripts getting damaged

Though manuscripts do not get directly exposed to rain, prolonged spells of rain during the seasonal rains lead to breeding of fungi that damage manuscripts. Also manuscripts that hold moisture get physically damaged during human handling. If the manuscripts are moist, letters inscribed on them in ink dissolve and fade away, besides creating stains of the deposited dust.

Flood

Excessive rains create flood and furies of nature cause tsunami. The flood thus caused ruins the rooms and repositories where manuscripts are preserved. Destruction and loss of manuscripts due to furies of nature had taken place at various junctures of time. According to Tamil writers, an ancient Tamil civilization existed South of Cape Comorin before it was lost to the sea in a natural disaster. In the 20th century, Tamil writers started using the name “*Kumari Kandam*” to describe this submerged continent. *Silappathikaram* reports of massive areas of land in southern country being swept away into the sea along with hills, forests and townships. Its vast size is first described in a 15th century commentary on *Silappathikaram*. The commentator *Adiyarkunallar* mentions that the lost land was located to the south of Kanyakumari. It has been a law of nature that tsunamis occur century-wise, causing loss of manuscripts in their wake, among other destructions.

Fire

Fire is another cause of irrevocable damage. The practice of keeping manuscripts suspended by slings (*asai*) in kitchens had led to loss due to kitchen fires which were common in former

times. A major loss was caused when a fire broke out in the Madurai Tamil Sangam. This fire accident, which took place in June 1920, ravaged rare palm-leaf manuscripts and books, a great and irredeemable loss to Tamil culture. Some writings have gone unpublished because their manuscripts were partly destroyed in fire accident. What could be brought out in print were only the remaining pages (Elankumaran 38). Another instance is the four storey building, entirely built of wooden rafters, which lies some 350 feet from the Pasupathinath temple in Nepal. It was also an archive of rare manuscripts and other documents. A fire accident in June 2005 reduced these rare palm leaf manuscripts to ashes. Thousands of manuscripts were thus consumed by fire (*Dinamani* 24June 2005).

Biological Causes

Microbial plant life such as fungi, tiny insects like book worms, cockroaches, termites, book lice, silver fish, and rodents like rats and squirrels – all cause damage to manuscripts. They are classified under biological causes.

Fungi

A major part of our heritage articles and manuscripts get damaged by the growth of fungi. In countries of hot climatic conditions such as India this damage is very prevalent. Fungi are microbial living organisms present in the atmosphere. They thrive under particular climatic conditions. Though several varieties of fungi are there, only the spores of a particular genus, called *Aspergillus*, which are of black, white and ash grey colour, cause damage to manuscripts (Plumbe 30). Fungi are structurally similar to miniature plants. Their roots penetrate into the texture of fibres of manuscripts, leading to a weakening of their fibres. They also suck the juicy material added to reinforce the bonding of the fibres. This results in damage to the bonding of fibres.

Also, the fluid secreted by the roots of fungi makes palm leaves and papers stick to one another besides making them acidic. Manuscripts thus affected, when immediately brought to a dry and hot ambience, undergo evaporation of moisture and get inseparably stuck together. Besides, the fluids also leave a non-erasable stain on manuscripts.

The growth of fungi on manuscripts produces an odour that attracts insects. Insects visit the manuscripts and eat the fungi, causing damage to the softened manuscript material. About 700 years ago, the Roman Emperor, Frederick II, had noted the damage caused by fungi. Coming to learn of fungal attack on inferior quality paper, he ordered that all paper manuscripts should be written on parchment (Plumbe 30). If fungi-infected manuscripts are not attended to in time, further damage by insects result.

Insects

Considerable damage is caused by biological agencies, in particular insects like book worm, cockroach, book lice, silver fish, termites and small animals like rats and squirrels. They damage not only manuscripts but also printed books, organic writing material and other cultural artefacts. In addition to the creatures mentioned above, bees and hornets also breed in tropical countries. In cold countries also some white coloured cockroaches, and bees have been found which damage cloth. Among the countries of the West, rare books in ancient Greece and Rome have been reportedly destroyed by insects. In his *Historio Animalium*, written in 335 BCE, Aristotle reports having seen in books insects resembling tail-less scorpions (Plumbe 2). In tropical countries, such as India several insects, mentioned earlier, damage manuscripts. By and large, book

worms are responsible for the loss of a great number of manuscripts.

Book Worm

Book worms damage manuscripts by boring holes through them. Book worms are hatched from eggs and 200 species of them have been identified (Cunha 80). When manuscripts are infested by fungi, insects that come to feed on the fungi lay their eggs and worms coming out of these eggs are called book worms. This worm is carrot shaped, with a thick head portion, tapering down to a slim tail. They are about 5 millimetres long and are whitish. They bore holes all through, entering from the top and exiting at the bottom and vice versa. When the worms metamorphose into insects and leave the manuscripts they lay eggs in turn, leaving them behind. If manuscripts are not properly treated for protection, book worms cause irreparable damage. After incising with stylus on palm leaves, if the manuscripts are not given an application of turmeric or the extract of *Cocina Indica* or *Datura* leaves mixed with lamp soot, the untreated manuscripts undergo rapid damage. This worm, *Gastrallus Indicus*, can penetrate all except metallic plate surfaces.

Cockroach

Cockroaches are yet another major destroyer of books. They are of various species and 1200 varieties have been identified worldwide. Ulisse Aldrovandus, an Italian naturalist was the moving force behind Bologna's botanical garden, one of the first in Europe. He is considered the father of natural history studies. In his notes published in 1602, he observes that the cockroach is a major enemy of manuscripts and books (Plumbe 9). In 1837, it has been reported that the cockroach was commonly found in great numbers in Western countries.

Cockroaches are generally found in kitchens and toilets of homes. They remain hiding during day and come out at night in search of food. They are 2.5 cm to 5cm long. The structure of their mouth is capable of biting and causing damage to palm-leaf and paper. They lay eggs numbering from 16 to 30 and have a life span lasting 6 months to a couple of years.

Moisture in manuscripts and the presence of glue in them attract cockroaches. The structure of its mouth is of such a design that it can scrape the surface of manuscripts, so it causes irretrievable damage to manuscripts. They are largely present where the manuscripts contain moisture, or when food material is present in book storage rooms. They cause damage either by gnawing on manuscripts from the top or attacking them sideways.

Termites

Termites too damage manuscripts beyond repair, and are found mostly in tropical countries. They can damage all organic materials. Termites live in colonies. They have social groups – king, queen, worker and guard. The queen possesses wings and it is larger than all the others in the colony. They are shy of light and are at work in areas of darkness. The queen is said to lay more than 30000 eggs per day to perpetuate its breed (Plumbe 7).

Termites live in the presence of moisture below the soil. Due to rain or other reasons when soil moisture reaches the ground surface, termite activity comes to the surface. At that time, manuscripts kept on floors, wooden articles, and untreated wooden cupboards – all come under their attack. They eat up and damage the insides of manuscripts and other articles leaving their outer surface intact.

Henry Smeathman, in *Philosophical Transactions* documents the destruction of a great number of manuscripts in

Africa (Plumbe 7). At various places of the Indian sub-continent, manuscripts have been lost to termite attack. In the 10th century C.E., King Raja raja of Thanjavur found the manuscripts of the *Tevaram* damaged by termites and appearing like an ant hill. They were retrieved by pouring pots of sesame seed oil over them and the portions of the manuscripts that had survived termite action have been restored.

Silver Fish and Book Lice

These two pests attack only paper manuscripts. Palm leaf manuscripts are not affected by them. Silver fish also goes by other names such as sugar moth. It is carrot-shaped, 2.5 to 3.5 mm. long and of light grey in colour. It has an antenna on its head and three tails. The structure of its mouth can scrape away upper surfaces, so when paper contains moisture, it scrapes away the powdery substances on the loading material coated on paper and thus cause damage. Likewise book lice also have mouth by which they can scrape away the fungi and adhesive substances on palm-leaf surface. These pests do not cause great damage to palm leaves, but continued scraping by them creates holes and cause damage in the long run.

Rodents

Tiny animals like mice, rats, and squirrels also damage manuscripts. They do not eat manuscripts for food but due to their sharp teeth and search for soft places for shelter they chew manuscripts and crumble them into tiny bits, thus destroying them.

Chemical and Gaseous Effluents

Industrial and technological advancement has given rise to chemical effluents. Machines and motor vehicles spew out gases like carbon-dioxide, sulphur dioxide, sulphur trioxide,

nitrogen dioxide, nitric oxide, hydrogen sulphide etc. The air in coastal towns contains salt particles. These chemical gaseous substances combine with atmospheric moisture, ending up in the deposit of carbonic, sulphurous, sulphuric and nitrous and nitric acids on manuscripts. They damage the fibre, besides bringing about colour changes, leading to deterioration of manuscripts. Chemicals also affect the cellulose-chain bond of plant fibres thus damaging them. Acids also react with lignin in manuscripts causing colour changes. Oxygen in the atmosphere causes oxidation leading to colour changes. Chemical changes caused by ozone in air hasten the process of deterioration of manuscripts. Kenzo Toishi has discovered that chemical particles cause damage to manuscripts stored in newly-constructed concrete buildings which are less than two summers old. This is because of the emission of chemical fumes by fresh concrete (Agrawal 13).

Human Causes

Bias and prejudices between peoples, religious intolerance, wars and such factors have been the cause of wilful destruction of manuscripts. Wars, political changes, migrations of people, and differences between religious faiths have caused destruction to manuscripts. As early as the 6th century BCE, libraries were established and came into being for the purpose of recording and preserving thoughts and ideas for the sake of future generations. Such repositories have been targets of attack for the reasons cited above. The Alexandria Library of world-wide renown was attacked during Julius Caesar's invasion in 48 CE resulting in the destruction of 700,000 manuscripts. The Athens Library was destroyed during the 6th century CE. The library of Asia Minor, with its collection of 300,000 volumes, was destroyed.

Libraries housed in temples and palaces of our country suffered destruction during invasion by foreign kings. The British, who came to India for commercial enterprise at the end of the 18th century, turned into colonizers and in this process destroyed several palaces and carried away to England, manuscripts preserved in royal palaces. Notable among them is the palace library of King Tippu Sultan. When he was defeated by the British in 1799, the British took away to England various articles from his palace, along with its library collections. Charles Stewart, the Professor of Cambridge University, prepared and brought out a printed catalogue of these manuscripts.

Destruction by Consigning to Flames

Consigning of manuscripts to flames has been another cause of their loss. China is said to be the first nation that consigned books to fire. The Chinese emperor, Qin Shi Huang of the Qin dynasty of ancient China, who raised the Great Wall of China, is said to have set fire to the writings of Confucius because of his dislike to the latter. In our own times, when Hitler came to power systematic burning of books began. On the midnight of 1st of May 1933 thousands of students stormed into many universities of Germany and set fire to their libraries. In 1988, a fire accident in the Academy of Science Library in Leningrad is said to have claimed 400,000 volumes.

Whenever people failed to understand the true import of religions that rose to nourish compassion and culture, religious strife ensued, resulting in the destruction of manuscripts, temples of rival religions and their book repositories. Religious bigotry gave rise to claims that the scriptures of one's religious faith can withstand ravages of fire and water. This foolish bravado led to the consigning of manuscripts of one's own religion to flames and floods thus sending them to destruction. A case in

point is the legend of the Tamil saint Gnanasambandar. In the city of Madurai there arose a dispute between him and the Jain monks as to the superiority of their respective religious faiths. This led to a “test by fire” in which each group consigned their own scriptures to flames. Those belonging to the Jains turned into ashes while those of Gnanasambandar remained intact when subjected to flames. Likewise, they were thrown into River Vaigai in which the Jain writings were swept away by the current while Sambandar’s palm leaves “swam” upstream and safely reached the shore. If these “reports” are to be believed, then the loss of Jain manuscripts is an irrevocable loss to the Jain religion.

Manuscripts were consigned to flames not only due to religious strife, but also out of good intentions. For instance, manuscripts damaged by pests were dipped in ghee and consigned to flames during *yagnas* after making copies in order to prevent further spread of pests to unaffected manuscripts. But the practice of consigning them to flames continued as an act of piety, without making copies. Such acts of misguided, but pious intentions led to irretrievable loss of manuscripts. Another instance is the practice of burning of manuscripts used by the elders when their bodies are cremated after death.

U.V. Swaminatha Aiyer (1855–1942), a Tamil scholar, was instrumental in bringing many long-forgotten works of classical Tamil literature to light. His singular effort over five decades brought to light major literary works in Tamil and contributed vastly to the enrichment of its literary heritage. He travelled widely in search of palm leaf manuscripts for the purpose of publishing hitherto unpublished texts and editions. He visited Karivalam Nalloor in Tirunelveli district on learning that the

manuscripts of the 9th century Pandya King, Varaguna Pandian were being safeguarded in the temple there. His delight turned into despair when the temple trustee informed him that, out of deference to them, they were all dipped in ghee and consigned to flames after raising a holy fire because old manuscripts, which are sacrosanct, should not be kept lying about just anywhere.

Consigning Manuscripts to River Currents

Similar to the practice of “cremation” of manuscripts, those infected and damaged have been “buried” in river currents on select, auspicious days. This was done after making copies of the damaged manuscripts to prevent the infection from spreading to other unaffected volumes. In the Tamil country, the 18th day of the Tamil month *Aadi* (mid-July to mid-August) is religiously celebrated each year as the day of advent of river-flood since time immemorial. When this festival in later times became a ritual, people at large, out of ignorance, began letting manuscripts into the flood or consigned them to fire during the *bhogi* (mid-January) bonfire, sacrificing even good, undamaged manuscripts.

When U.V. Swaminatha Iyer was in Tirunelveli during his search for manuscripts, he came to know that one Subbiah Pillai, an advocate living in South New Street there had a good collection of manuscripts with him. When Swaminatha Iyer went to his house, Pillai said, “We had a cartload of manuscripts. They were all getting broken and damaged. I was wondering how to get rid of them as they were useless and occupying a great deal of space. I did not know how to decipher their contents and felt that they were of no use in these times of printed books. Some elderly women informed me that it was the custom to bundle them up in the shape of a chariot and then consign them to the new floods on 18th of *Aadi*. I thus let them all into the irrigation canal on that day to be carried away by

the running waters (Swaminatha Iyer 678). Swaminatha Iyer informs us that not only individuals but also the various religious *mutts* have been following this practice. On one such visit of his to an *Aadheenam*, he could find thousands of palm-leaf manuscripts properly bound and stacked in their library. On his next visit there, when he enquired about them *Karuparu Tambiran* (an Assistant Mutt Head) told him that several *Kanakku churunaigal* (Account palm-leaf manuscripts), along with a number of other damaged palm-leaf manuscripts were carried away in a small chariot to be consigned to the Cauvery floods (Swaminatha Iyer *Nalluraikkovai* 65). Such acts of blind superstitious belief are witnessed in certain places even in these days when people are educated and modern.

Taking Away by Foreigners

Archaeological evidence tells us that India had trade relations with countries of the West for the past 2000 years and possibly even before that. In addition, Oriental Buddhist scholars and pilgrims who had come to India to acquire learning collected hundreds of scripts. Loss of manuscripts by selling them off may be said to be due to lack of awareness. Manuscripts have been purchased and taken abroad by Western researchers, scholars, those who had done field research in countries of the Orient, foreign traders coming for purposes of commerce and other general tourists. They were willing to pay a high price for manuscripts. They succeeded in their attempts due to the prevailing poverty in our country. To coordinate such transactions there were brokers and traders. Thousands of such manuscripts sold by Indians and procured by foreigners can be found today in libraries and museums in the West, as mere show pieces, their contents or even titles yet un-deciphered. The rare wisdom that they might possess remains unknown.

Loss Due to Lack of Awareness

A number of manuscripts that bear testimony to our tradition, culture and heritage were lost due a lack of awareness or force of circumstances. They happen when people do not realize the value of manuscripts. Selling of manuscripts to foreigners has led to these documents being displayed in libraries and museums abroad as show pieces. Some of them are virtually kept “imprisoned,” hidden from everyone’s eyes. The author saw some manuscripts in the libraries of London without a title. Not understanding the wisdom of our ancestors, superstitious beliefs and wrong preservation methods in the name of conservation have also resulted in loss of manuscripts.

Negligence

Manuscripts held in temples, palaces and mutts are subjected to damage due to insufficient knowledge of their custodians about the contents of manuscripts or methods of care. Individual owners of manuscripts often lack the financial means of providing protection. Considering their possession as a matter of social prestige, they take them out once in a year for a ritualistic, pious worship and leave them unattended otherwise. Such inadvertent negligence also has caused loss of manuscripts. While this author was on a visit to a village in Erode district to collect manuscripts, he found the manuscripts bundled in two sacks and kept in a lumber room. The sacks were taken out on Saraswati Puja day each year and after offering annual worship, again returned to the lumber room. For years the sacks were unopened and as a result of not cleaning them up, they were all damaged. Insects and rats had ravaged them. Some people own manuscripts but simply have no idea of what to do with them. Some refuse to hand them over to

anyone out of sentiment that they were property left behind by their forbears, not to be given away.

Specific Damages to Palm Leaf Manuscripts

Because of the deteriorating factors, mentioned above, manuscripts undergo various types of damages. Damages to manuscripts may be studied under two heads, namely, damage to palm-leaf manuscripts and damage to paper manuscripts. Palm-leaf and paper manuscripts, though both are of organic origin, one is naturally obtained and the other artificially produced, factors affecting them and the means of protecting them vary. The main damage to palm-leaf manuscripts can be classified as under:

Change of Colour

The colour of palm leaves turns lighter as they dry. Drying them under shade, leads to a slight change in their colour. Plant extracts and lamp soot applied over for writing upon them, darken their light tone to some extent, and make the writing visible. Other reasons for colour change are – bundling them immediately after the coating without allowing time for the coating to dry, fungal attacks, chemical changes by oxidation that take place over long periods, chemical changes caused by the action of ultraviolet rays in light to lignin that is present in leaves, and atmospheric pollution. The habit of storing them in kitchen lofts to save them from insects and fungi leads to colour change due to deposit of kitchen smoke. Dust settling upon manuscripts and harmful chemicals present in chemical coatings given to protect the manuscripts and mere ageing also lead to colour changes. Such changes can be reverted through certain techniques or by chemical applications, but colour changes, due to ageing is difficult to be removed.

Fading of Letters

When written characters are not clearly visible, it is described as fading of letters. Lamp soot mixed with plant juices – is coated on palm-leaves incised with writings. This coating loses its adhesiveness over time. Also, repeated handling for reading purposes lead to the falling off of the soot from the incisions. Fading due to the reasons mentioned above can be rectified by a simple reapplication of the mixture of plant Kovai leaves (*Cocina Indica*) or *Datura* leaf extract and lamp soot. Generally re-inking is done by mixing soot with preservative oil like citronella oil or lemon-grass oil.

When moisture present in the manuscripts dries up, characters on them appear as if faded. A coat of protective oil makes them again appear bold. In northern India, palm leaves were written upon with ink, and these have to be handled with additional care. Rough handling leads to the abrasion of their surfaces resulting in ink particles coming off. This falling off of dried ink results in the fading of letters.

Cracks and Peeling of Leaves

Palm leaves are to be handled and stored with due care. Leaves with little or no moisture get broken at their edges while taking them out and putting them in boxes or cupboards. Formation of fungi leads to the sticking together of palm leaves. If we are not careful while separating such leaves, writings stuck to the lower surface of the leaf above peel off. Moreover, when leaves that have become desiccated are separated, the portions affected by fungal attacks get damaged. Fungus infected manuscripts also become the targets of book worms. Escape of moisture due to climatic heat make the leaves stick together. Uneven evaporation occurs at the outer edges when compared

to the inner portions. This uneven evaporation leads to cracks along the length of the leaves. Strings used for stringing leaves together may happen to be thicker than the string-holes. Sometimes they may lack smoothness, and sometimes they are full of torsion. Such strings damage the holes while unstringing and stringing together of manuscripts. Strings that have less torsion and of yellow or red colour (which would repel insects) should be used.

In countries of hot climate, high variations in climatic temperature lead to the escape of moisture from palm leaves. This results in loss of flexibility. And while handling such leaves they tend to crumble. Also, due care is to be taken to ensure that the string that is used to bind the manuscripts together presses upon them very gently. Loose binding leads to bending or twisting of manuscripts. When volumes of manuscripts are kept piled one on top of another they also cause heavy pressing which leads to damage of leaves under pressure. Manuscripts also get damaged by under scorings made in various colours by readers for their reading convenience.

If we leave manuscripts with ink writings open during rainy or humid seasons, the inked characters absorb the atmospheric moisture, diluting the adhesiveness of the ink, and the pigments drop off. Expansion and contraction levels being high in extremely hot climates, leaves expand beyond normal levels leading to cracks in drawings and paintings on leaves. Loss or mechanical damages occur by cockroach bites, rodent bites and termite attack. This loss of leaves may be in the edge or centre. If the leaves have loss, letters will also be lost.

Damages to Paper Manuscripts

Paper manuscripts undergo some damages specific to them. By and large, paper manuscripts in India are of hand-made paper made in India or abroad and factory-made paper manufactured in the later part of the 19th century. Not only natural causes but also man-made causes such as improper handling and protection have contributed to their damage. Paper manuscripts, not bound together with rigid card boards above and below or when bundled together by strings which abrade against their edges, are subject to damage. Using binding cardboards and wrapping sheets with high acid content and of inferior quality also cause damage to manuscripts.

Black ink, or inks of other colours used for writing should be acid-free. Otherwise, the inks erode the paper upon which they have been used and damage the stationery. In particular, the light blue verdigris, used largely in drawings, absorbs atmospheric moisture and turns into a darker colour, besides damaging the fibres in the area under this colour. This leads to deterioration of the manuscripts.



CHAPTER V

PREVENTIVE CONSERVATION OF MANUSCRIPTS

Conservation of manuscripts means protecting them from damages, deterioration or changes. Conservation has been going on from the very day that man started writing. But the techniques employed differ from place to place, from material to material used and in different climatic regions. Our ancestors had been using easily available plant products or other materials of everyday common use to save manuscripts from damages caused by various factors. Conservation methods can be classified into traditional methods and scientific methods. Proper storage, handling and periodical verification would prevent damages.

Traditional Storage System

Traditional methods are those which have been continuously in use from periods of distant past. Our ancestors had employed several methods to protect manuscripts from both natural and man-made causes. These methods include the selection of the spot for storing manuscripts, manner of handling them, protecting them from fungi and insects, periodical inspection and repairing, and making of copies. Various selected spots were used for the safe-keeping of manuscripts. They include jars, wooden almirahs, wooden chests, in temples, *samadhi* tombs, underground cellars etc.

Manuscripts deteriorate at a faster rate in regions of hot climate than in colder regions. The reasons are expansion-contraction of manuscript material due to variations in climate

besides attack by fungi and insect pests. In ancient times, Egypt, Greece, Rome and their neighbourhood countries, preserved clay tablets and papyrus manuscripts in earthen jars with lids (Richardson 33). With the passage of time, they began to be stored in air-tight boxes made of wood or ivory. Apart from boxes, tubes made of wood, bamboo and brass had also been used (Richardson 144). We come to know that in 65 BCE, papyrus manuscripts were coated with cedar oil and stored in clay jars.

Cloth Covering

Manuscripts were kept tied in cloth to safeguard them from dust, light, and humidity in air. In particular cotton or silk cloth was used. Yellow or red cloth was used to repel insects and fungi. Certain important manuscripts were covered not only with cloth but also with deer skin or pouches made of skins of other animals. Mostly cotton or silk threads were used for tying together palm leaf manuscripts. To protect damage to edges and corners of manuscripts due to tying wooden boards were placed on the top and bottom before bundling. They were stored in wooden almirahs. Important manuscripts were kept in boxes lined with brass strips. Wall-mounted racks were made by joining planks and books were stored in them. Documents of special importance were bordered with decorative strips of brass, copper or ivory.

Wooden Almirahs and Cupboards

Libraries in the West, Christian churches and mosques preserved their books in separate wooden almirahs. In a temple in Kandy, Sri Lanka, palm-leaf manuscripts are found stored in wooden chests. These chests were called "*pettagam*." In the Sri Lankan Buddhist temple of Tambala Viharain two wooden chests containing manuscripts stored in them are found (Piyadasa 25). Tenth century reports by overseas visitors to

Sri Lanka have recorded that important manuscripts have been beautified and stored in boxes coated with lacquer. Palm-leaf manuscripts enclosed in a box decorated with pearls were sent to the Dutch king from Sri Lanka.

In several libraries of India we see that manuscripts are bundled in red colour cotton or silk cloth and stored in wooden almirahs. In Thanjavur Sarasvati Mahal Library paper manuscripts are tied up in red or yellow coloured silk or cotton cloth and preserved in wooden almirahs because they would retain steady climatic conditions inside. When Bishop Heber visited Thanjavur during the reign of King Serfoji II, he visited the Thanjavur Palace and reported later that Serfoji had two libraries, one for books and the other for manuscripts, and observes that they were kept in ten big-sized and ten small-sized almirahs (Richardson 169). These almirahs are still being used today. In places where bamboo was naturally available, short lengths of bamboo poles were made like tubular pipes inside which manuscripts were preserved.

Temples

Manuscripts were preserved in particular spots inside temples such as a room in the tower (*gopurams*), sanctum sanctorum and in lofts, in the ventilation openings called *salaram* in *gopuram* tiers. In several temples in northern India, small pyramid shaped chambers were built in the inner *prakaras* (corridors) for storing manuscripts. These were known as *granta samadhis* (a separate shrine for storing manuscripts). In Tamil Nadu temples lofts were set up in the four corners of the upper areas of the sanctum sanctorum, and manuscripts were stored there. Smoke rising from camphor and incense offerings would get deposited over them that would repel insects and prevent fungal growth.

Homes

Underground cellars, lofts and *puja* rooms of residential houses were used for keeping books covered in cloth or in wooden boxes. In Orissa underground cellars were built in houses and manuscripts stored in them. Lofts were set up in kitchens for keeping manuscripts or suspended in slings. Manuscripts stored thus have been found damaged due to excessive kitchen heat. Manuscripts were safeguarded in *puja* [prayer] rooms, particularly in the homes of scholars, astrologers, and healers. The fumes from burning of camphor and aromatic incense act as a protective agent. Moreover, the tradition of opening, reading and re-tying them on auspicious and religious occasions help in their maintenance.

Handling of Manuscripts

To inculcate in us the habit of cherishing and valuing manuscripts, our ancestors have depicted deities holding manuscripts in their palms — particularly those related to learning such as Dakshinamurti, Sarasvati, Brahma and Hayagriva . Likewise, statues of *Tiruvalluvar*, Saint *Avvaiyar* and *Manickvachakar*, who were outstanding composers of poems, were depicted holding manuscripts. Manuscripts were handled delicately like babies. Besides, an X shaped wooden stand for resting the book was in used, while reading it. This stand was called “*jnana peetam*” (seat of wisdom).

Cleaning of Manuscripts

The first step in manuscript protection is to ensure that they are clean. Substances deposited on manuscripts should be removed by cleaning. These are dust, smoke, insect excreta, fungal deposits, and juices and oils secreted by plants, and material that had been used earlier for their protection. Dust

and other deposits on manuscript surfaces result in obscuring of inscriptions, colour change and damage due to chemical reactions.

A soft brush can be first used to remove accumulated dust particles. Fine cloth and cotton-wool stuffed cloth, like small pillows, can be made to wipe the surface clean. Cotton wool as such should not be used because strands of cotton fibre get stuck to the letters incised on palm leaves and also to the holes bored by insects. This may result in the tearing or breaking of the manuscripts. After removing the fungi, infected manuscripts should be wiped clean finally. Cloth used for cleaning such manuscripts should be discarded and fresh cloth used for cleaning uninfected pages. Using the same cloth may entail spreading of the fungi into hitherto uninfected manuscripts.

Occasions for Palm-leaf Manuscripts Cleaning

Worship offerings and festivals were held by our forebears with a view to promoting manuscript protecting activities. Appointed days for manuscript maintenance were fixed by way of festival and auspicious religious events. Cleaning of manuscripts prior to the onset of rainy weather and airing them out at the end of the wet months used to be done. Such airing protects the leaves from damage by breeding of fungi. In this context it would be relevant to quote the head of the Jain *mutt* in Shravanabelagola in Karnataka, who once said: Taking the climatic conditions of southern India into account, every year, during the four-months period called *Chatur maasam*, lasting from *Aadi* to *Aippasi* [mid-July to mid-November], monks and *sadhus* never undertake trips anywhere. This time was utilized for study, protective maintenance and copying of texts. Every year, the cloth covering on manuscripts bundles are replaced with fresh cloth. It was for this reason that pundits learned in

scriptural texts were honoured by rulers by presenting them with gold-laced shawls.

Separation of Stuck Leaves

Palm-leaf manuscript volumes, left unopened for long, end up with the leaves getting stuck to one another. This happens as a result of dust and moisture settling upon the upper leaves, excessive application of protective oil coatings, growth of fungi and book worm attack. This is called blocking of palm-leaf manuscripts. Such leaves can be separated by spreading protective oil on the top surface or the blocked bundles may also be subjected to steaming and then separated.

Oil Application

A certain percentage of moisture is needed in the structure of palm-leaf manuscripts to keep them flexible. This moisture level required in palm-leaves gets depleted due to evaporation during excessively hot weather. To prevent this loss of moisture essential oils that evaporate easily is applied on their surfaces. Essential oils give flexibility to the leaves and when the leaves have oils it would prevent both evaporation as well as excess absorption of moisture. Essential oils are extracted from some plants and have an aromatic smell that keep away insects. Some of the essential oils used for palm leaf preservation or citronella oil, olive oil, lemon grass oil, cedar wood oil, neem oil, sandal wood oil, clove oil, or eucalyptus oil. National Research Laboratory for Conservation of Cultural Property in Lucknow has conducted research to determine the evaporation properties and strengthening properties of traditionally used oils. Their research reveals that clove oil, citronella oil, turpentine and eucalyptus oil have the property of providing instant strength and flexibility to disintegrating palm leaves.

Use of Insect Repellents in Repository Chambers

Several kinds of naturally available aromatic substances having odour that repel insects were used in chambers and chests containing manuscripts. The earliest known insect-repellent material used was cedar wood boxes coated with cedar wood oil. The historian Horace has noted the use of cedar wood oil for manuscript protection for more than 300 years (Plumbe 15). Pliny has reported that documents, treated with cedar oil and buried under the earth, were found undamaged when they were unearthed after 500 years (Plumbe 2). Dr. E. A. Back says that the Bible was preserved by treating it with cedar oil and kept in earthen pots (Plumbe 3). In U.S.A., even today, in bureaus in which books are kept, small cedar wood balls are thrown in to repel insects.

Like the practice of applying cedar wood oil as repellent, a number of other natural substances have been used in various regions. They are dried-in-shade neem leaves, flowers, seeds, leaves of *pungam* (pongamia) and the eucalyptus tree, tobacco leaf, cinchona leaf, oil of clove, camphor, *vettiver* root (*khus khus* in Hindi, common name Camel grass), pepper, clove, alum, and turmeric. Palm-leaf manuscripts were also protected by colouring them red.

In the Sarasvati Mahal Library of Thanjavur, insect-repellent aromatic substances are powdered and kept in tiny tied-up cloth bundles inside almirahs in which manuscripts are stored. They contain a mixture of 1 part sweet flag, 1 part black cumin, 1/4 part pepper, and 1/4 part clove by weight - all dried in shade, powdered and made into bundles of 12 cm square with muslin cloth after adding 1½ tea spoon of this powder mixture and 5 grams of *poochoodam* (pure camphor). From the notes of Kuppa Bhattulu, who served as a librarian here in

1882, we reckon that this practice had been followed for 120 years.

Other than aromatic repellents, snake slough has also been used. Such a skin was discovered in the bottom trays of paper manuscript almirahs in the Sarasvati Mahal Library. Dr. O.P. Agrawal records the use of such skins in several libraries on account of the belief that snake slough repel termites (Agrawal 74).

Red coloured cloth is used for covering book bundles. Light rays reflected off this cloth give out infra-red rays. Since the eyes of insects are intolerant to these rays they do not come near red or ochre coloured materials. Our ancestors saw that insects stayed off red colour and so had made use of this colour in the past for such purposes.

In Kerala manuscripts were kept stored in air-tight wooden chests (Vijayan 166). In Andhra Pradesh, powdered *vasambu* [sweet flag] was kept in manuscript almirahs (Satyavani 8). In Karnataka, manuscripts were bundled in red cloth and kept in wooden chests and almirahs. In addition, palm-leaf manuscripts were coated with oil obtained from herbs (Pandurangan156). In Assam, a grass called bandari, sweet flag and *nochi* (Nirgunda; botanical name, *Vitex Negundo*) – plants possessing natural insect-repelling properties were made use of. In northern India, camphor, neem leaf, sandal wood, leaf of *aswagandha*, (botanical name: *Withania Somnifera*), agar-wood, snake slough, and sandalwood powder were also used for fumigation as insect repellent. While using insect repelling material, continued use of the same substance leads to insects getting immune to its odour. Therefore, different kinds of substances should be made use of by changing them once in three months to ensure that pests are repelled by their odour.

The months immediately following rainy ones are favourable to breeding of insects. Therefore, in the months of *Margazhi* and *Thai* [mid-December to mid-February], in temples and in homes of Tamil Nadu, white-washing of walls with lime was done to prevent fungal breeding and stripes were drawn in red or ochre to prevent entry of pests. Books were kept covered in red cloth bundles for the same reason. This practice is followed till this day in some of the libraries of Tamil Nadu and in other southern states. The practice of protecting manuscripts with cloth has been there from the period of the Jains in the 13th century. The use of red cloth has been extensively researched by Dr.O.P. Agrawal.

Use of Insecticides

Apart from repellents, naturally available insecticides have also been used. In China, in the 3rd century CE, an insect killing extract known as *huangnieh*, obtained from the sap of the cork tree was prepared and added to paper pulp at the time of its manufacture. Paper which contained this insecticide was yellowish in colour. A government order of 674 CE in China made it mandatory to manufacture stationery paper thenceforth by adding insecticide to the pulp (Plumbe 2). *Remedium Contra Vermes Librarum* (Remedies Against Book Worms), a book written in the 13th century, mentions that chemical insecticides were used in 993 CE in a library in Baghdad by a librarian Sabur Ibn Ardasi942-1025 (Plumbe 18). In South India, frankincense, akhil (*Aquilaria*), and sandalwood smoke have been used to repel and to terminate insects. In Karnataka, the juice obtained from the stem of a plant and in Orissa, the extract from a certain bean plant has been used to prevent pest attack.

In some villages and towns pundits not only open and clean manuscripts once a year, but also conduct public reading sessions of scriptural literature like the *Ramayana* and the

Mahabharata. When members of a family migrate to other cities or settle abroad they are presented with copies of the manuscripts held in their homes. The deep-rooted habit of preserving at least one or two manuscripts in every house, and the belief that keeping manuscripts at home brings wealth and gold, has led to the practice of preserving books in the household of all educated families.

Protection of Palm-Leaf Manuscripts

Even at the time of obtaining of palm leaves those that are flexible and would withstand attack by pests are carefully selected and prepared for writing. The outer surface of palm leaves have a thin transparent laminate layer. This coating prevents moisture from the atmosphere being absorbed by the leaf. While incising with stylus for writing this protective laminate gets punctured. This damage leads to absorption of moisture by leaves and consequent damage caused by retention of moisture. So, to protect them and also for better visibility of letters, a coating is applied after writing. It consists of lamp soot (obtained by burning castor oil) mixed with the juice of *kovai* leaf (*Cocina Indica*) or with *datura* leaf. In certain regions, instead of lamp soot, burnt *darbhai* (*kusa*) grass or burnt sweet flag is used.. Such coating prevents absorption of atmospheric moisture and also fungal and other pest attacks.

In tropical climates as in India, moisture present in palm-leaf evaporates into the atmosphere, leading to loss of flexibility of the leaf. Such leaves break easily unless handled with due care. Juice extracted from leaves is applied to bring back flexibility to leaves. Also oils of thin consistency, obtained from plants, which would easily evaporate and dry, are used. Among edible oils, sesame oil (*gingili* oil) alone is used in certain parts. The *Periya Puranam* epic describes how King Raja Raja

recovered manuscripts from the Chidambaram temple, buried under ant hills, by pouring sesame oil over them before retrieving them. This report informs us of the use of sesame oil for making brittle manuscripts flexible. In Bengal region too sesame oil had been in use for similar purposes.

Today, we find several libraries housing palm-leaf manuscripts incised by stylus protecting their collection with turpentine, citronella oil, lemon grass oil or sesame oil. Application of oil serves the dual purpose of preventing the escape of moisture and increasing the flexibility of palm leaf manuscripts. In the Palm-leaf Manuscript Department of Tamil University in Thanjavur, neem oil is used for protection of manuscripts. Since neem oil is very viscous and thick, it is first thinned by heating a litre of neem oil with a couple of banana peels which are put in while heating and then taken out. This is then followed by adding 10 grams of pure camphor. This treatment renders the oil thin and the unpleasant neem odour is neutralized by the addition of camphor. Neem oil does not easily dry or evaporate in air and this property ensures flexibility to manuscripts over a long period. The faculty members of this department say that the neem odour lasts for five years and flexibility is retained for ten years. The excess of oil is wiped off, for otherwise it results in deposit of dust and the sticking together of leaves. Libraries in Karnataka make use of an oil preparation from vegetable sources which they call '*Thala granta* oil'. Palm-leaf Library in Melkote, Karnataka and Oriental Research Institute and Kannada Adhyayana Samsthe Libraries (in Mysore) made use of the following concoction: sesame oil 10 litres, pungam oil 100 ml, neem oil 100 ml, camphor 100 grams, juice extract of Adathoda Vasica leaves 500 ml. These are mixed together, heated and used after the mixture cools. ●

CHAPTER VI

CURATIVE CONSERVATION OF MANUSCRIPTS

Storage of Manuscripts

Manuscripts should be stored in wooden almirahs in rooms where proper climatic conditions prevail. Individuals and institutions possessing limited number of manuscripts can keep them in separate boxes or separate cloth bundles and then store them in almirahs. In institutions having a great number of volumes they should be stored in wooden or steel almirahs. The almirahs must be located in rooms which are well ventilated.

In the 19th century, silk or cotton cloth was spread and glued to the topmost sheet of these manuscripts as protective cover. Some important documents have been bound with cloth or animal skin as in note-books of the present days, and the cover at the bottom has been brought over and folded over the top for protection. In later times paper manuscripts have been supported above and below with acid-free cardboard and preserved inside acid-free cardboard boxes.

In the beginning, any available paper was used for mending of paper manuscripts. Adhesive tapes too were used. Damaged manuscripts with writing on only one side are now mended with tissue paper or laminated with cellulose acetate foil and tissue paper. These are also protected by encapsulation. Manuscripts damaged by acidity must be made acid free. In the beginning, thin, acid-free paper was inserted between manuscript sheets

to absorb acidity present in them. Later chemicals like ammonia were used for removing acidity by fumigation method. The ammonia-steam method was evolved through researches done by National Archives of India, New Delhi.

Modes of Storage

Formerly manuscripts were stored by stacking them one above the other in wooden boxes or almirahs. This resulted in damage to manuscripts and difficulty in accessing. To overcome these shortcomings, wooden almirahs with tiers of trays of short height are now used to avoid heaping of books. Each volume can be independently stored and accessed in these tiered almirahs. Some libraries having a limited number of book collections store paper manuscripts wrapped in cloth. In Western countries paper manuscripts are stored in individual acid-free cardboard boxes.

Storage Rooms for Manuscripts

Several libraries have air-conditioned rooms for storing palm-leaf and paper manuscripts. Except a very few among them, the air-conditioners function only during the library working hours. Besides, they lack temperature and humidity control mechanism. These deficiencies result in damage to manuscripts.

Repositories of paper manuscripts should be maintained at 50 to 55% R.H and 20 to 22 degree Celsius temperature. Relative humidity prevailing in excess of 70% may result in the growth of fungi and insects. So, maintenance of these levels is essential inside storage rooms. Air conditioning functioning 24 hours of the day ensures protection from dust, heat, fungi and pests. Light intensity in these rooms should be at 15 lux. Facilities to increase and reduce light intensity ensure longer life to manuscripts.

American research experts in protection of manuscripts and books have found that the protective environment in storage rooms, if monitored regularly, would keep variations of temperature and humidity under control. Their research findings have shown that a paper manuscript has a life of 2634 years when it is kept at 5% R.H. and 0°C temperature. The same manuscript would last a mere 197 years when it is kept at 50% R.H. and 9°C. At 95% humidity and 34°C they get damaged very fast (*New Tools* 7).

A separate hall with rare artefacts of the world, situated inside the National Museum in Tokyo, is built and maintained taking all such factors of protection into consideration. This museum is kept closed during wet and hot weather seasons. During the months of moderate climate it is thrown open once in a week. More than a hundred people are not allowed to remain at a time. This ensures that even the breathing action and body heat of visitors do not affect the constant climatic condition maintained inside.

Air Conditioning

Deterioration of manuscript can be kept under check by maintaining controlled climate in their storage rooms. This room should have even air conditioning round the clock. Many libraries have their air conditioners working only during their working hours. This results in a daily expansion and contraction of manuscript, due to the rising and falling levels of relative humidity. This daily variation leads to faster deterioration than in non-air-conditioned rooms! In the event of a mechanical breakdown, the air conditioning equipment must be set right and made to function within twenty-four hours. Or a provision for a backup air conditioning must be made. The storage rooms should have temperatures between 22° and 25°C and RH between 50% and 55 %. If this is steadily maintained, manuscripts can be saved from general deterioration. Another

advantage of air conditioning is that dust, excessive sunlight, temperature and humidity levels can all be kept under control, which in turn prevents growth of fungus and other pests on manuscripts.

In India some archives are maintaining 24/7 climate control of 21°C (+ or – 1 °C) and 55% RH (+ or – 5% RH). The Satya Sai Archives at Puttaparti preserve manuscripts not only in controlled climate but also in Oxygen-free environment. The manuscripts are stored in airtight boxes with Helium gas at normal atmospheric pressure.

Scientific Methods

From the 18th century onwards multifarious techniques were employed by libraries and manuscript repositories to ensure protection from insect attacks. As a result of researches chemical compounds began to be used more widely than naturally available material. From 1990 onwards, researches carried out in temperate countries and in Japan, and in other countries having a wealth of art objects, manuscripts and documents, have revealed that when chemical substances are used indiscriminately without taking into consideration varying climatic environments, the protective chemicals themselves cause damage. So, while using protective chemical agents, care must be taken to ascertain changes caused by them in various climatic zones. There is at present a worldwide reversal of trend towards non-chemical protection or minimal use of chemicals in the care of cultural artefacts.

Chemical Repellents and Insecticides in Storage Rooms

Both naturally available and chemical-based insecticides have been in use in book storage rooms. In particular, a mixture known as Keats Powder, a mixture of Fluorocarbon has been

in common use. Naphthalene balls and lumps are popular insect repellents. Naphthalene balls are the most widely used insect repellent, but the continued use of the same substance makes the insects immune to it over a period of time. So, continued use of the same repellent should be avoided. Insecticides like D.D.T., B.H.C., dusts and methyl bromide used to be sprinkled in libraries. These chemicals are harmful to human users of the library and the environment around the library. So the use of toxic chemicals should be avoided.

Fumigation

To control breeding of fungus and other pests in inadequately protected manuscripts, fumigation was done in the olden days. Frankincense or *akhil* smoke was used as insecticide and fungicide. Camphor too has been used as fungicide. Today such treatment is scientifically given in specially fabricated wooden or iron chambers. They have perforated trays or trays made of rods. They also have provision for fixing heating lamps for heating the chemical substances kept inside for fumigating. They are also airtight.

A chemical by name Thymol is used for control of fungi. 100 grams of the chemical is used for an almirah of 1 cubic metre capacity. Thymol is a naturally evaporating substance. To increase its rate of evaporation a 25 watt incandescent bulb is turned on for half an hour every day. This treatment, repeated for 5 to 7 days kills the fungi in manuscripts. Since Thymol vapours are lighter than air they rise upwards, and so it must be placed at the bottom inside the almirah. Manuscripts inside must be kept wide open so that the fumes can travel inside the books. Bound paper manuscripts must be kept in the shape of an inverted 'V' or in such a way that the fume passes through them, while taking care that the leaves do not get bent. Pest and fungi affected manuscripts are also treated with Para-di-

chloro-benzene fumes. Its vapours are heavier than air so it is kept on the top-most tray of the almirah and heated with electric bulb. This chemical kills the larvae commonly called book worms. This treatment should be given for 7 to 10 days.

In very large libraries and document archives, manuscripts are preserved in vacuum chambers. After storing books inside and locking up, the air inside is sucked out and a vacuum created. After that a gaseous mixture of 9 parts carbon dioxide and 1 part ethylene dioxide is pumped in. It is retained inside for 24 hours during which time pests and fungi inside get killed. Though this fumigation process is simple, it has been banned in the Western countries since the chemical used pollute the atmosphere and is dangerous to the user if inhaled. In India too this method is now discontinued. As a result of recent researches, instead of chemicals, inert nitrogen gas is pumped into vacuum chambers. Pests are destroyed if nitrogen is retained inside the vacuum chambers. Likewise freezing technique is used to control pests. In this technique, manuscripts are subjected to slow temperature reduction from room temperature to -10°C . After maintaining -10°C steadily for 24 hours, temperature is gradually brought up to room temperature again. This method too is simple and does not require use of chemicals.

Pests are also controlled by various kinds of traps set up after studying their life style. Lamps emitting particular colours that attract particular insects are set up to draw them near and trap them. Sticky traps that attract certain insects towards the sticky substance are also used to control them. In hotels insect traps using violet light is used to attract insects, which are killed by using electrified-wire net.

Restoration of Palm-leaf Manuscripts

Copies of manuscripts used to be prepared for damaged manuscripts. In case only one or two leaves are damaged in a collection, copies have been made of damaged leaves only. If leaves get torn or broken, they are sutured with thread and needle.

Cleaning

After initially wiping deposited dirt off, stubborn stains or insect excreta can be cleaned by using swabs of cotton cloth wetted with mixture of equal amount of good, clean water and ethyl alcohol. Deposits of chemical nature can be removed by using acetone solution or dilute carbon tetrachloride. These can also be cleaned with a mixture of glycerine and water in the ratio of 1:10 or glycerine-ethyl alcohol mixture in the ratio of 1:1.

Separation of Manuscript Leaves

Palm-leaf manuscripts left unopened for long get stuck to each other. This happens because of formation of dust and moisture on the top surface or excess of oil coatings made to protect them, or by fungal growth or attack by book worms. Such manuscripts may be kept in a refrigerator for twenty-four hours after which the leaves separate easily. Alternately, these may be exposed to steam for 15 to 30 minutes and then separated. In Western countries machines emitting cold or warm air or machines spraying steam are used on manuscripts and then separated. If the leaves do not separate after such treatments, Citronella oil or distilled water mixed with equal part of Methyl alcohol can be applied on the manuscripts and then separated.

Restoration of Torn and Peeled Palm Leaves

Broken palm-leaf manuscripts are traditionally sutured together with thread. Because this repair results in damage to

palm-leaf manuscripts and sutured leaves lack in stiffness, they are often stuck together using cellophane tape. When such leaves press upon the ones next to them in a bundle, the adhesive gum beneath the cello tape gets squeezed out on all sides making the leaf stick to the one below. When such leaves are separated they are likely to break. Therefore, cello tapes are not to be used for repairing manuscripts. Cello tapes found in manuscripts may be removed by applying benzene and cleaned.

National Research Laboratory for Conservation of Cultural Property (NRLC) in Lucknow trains people on the technique of joining broken palm-leaf manuscripts by using powdered new palm leaves mixed with Poly Vinyl Alcohol or PVA emulsion. Palm-leaf manuscripts repaired in this manner have good bending property. In Western countries broken pieces of palm-leaf manuscripts are stuck together with the fibres found in thin tissue paper. Missing pieces of a broken palm-leaf manuscripts are repaired by using palm-leaf coloured bamboo paper. Also new palm leaves are seasoned to make them change colour to match the original broken leaf or with fresh, unused leaves of the same colour, if available. Severely damaged manuscripts are restored by sandwiching them between Japanese tissue paper or chiffon cloth with methyl cellulose gum and thus mended. In Western countries, nowadays “encapsulation” is done to protect and to handle damaged manuscripts.

Oil Application

To avoid damages caused by the application of protective oils, a mixture of lemon grass oil or Citronella oil with polyethylene glycol 200 or Ethyl Alcohol in the ratio of 1:4 is applied. This treatment has been found to restore flexibility and strength to deteriorated palm-leaf manuscripts. Application of

oil extracted from fresh palm-leaves has also been found to restore strength to manuscripts.

Conservation of Paper Manuscripts

Voluminous paper manuscripts are flanked by wooden boards above and below to protect their edges and bound in cloth bundles. To avoid papers getting shuffled or lost while handling, binding of sheets was done. To protect from the sweat of the palm of the user, manuscripts are bound with a wrapper. This wrapper is slightly projected from the edge and also goes over the back of the volume. Traditional insecticides were used to protect them from pests.

Cleaning

Paper manuscripts, like palm-leaf manuscripts, also require cleaning. Paper manuscripts undergo colour change as a result of dust deposit from the environment and also by absorbing atmospheric moisture. Dust deposits on paper manuscripts must be wiped clean by brush, with cotton or with thin cloth. Engrained dust and smoke discoloration can be removed by rubbing with a rubber eraser. Rubber gratings are also used.

Stains and deposits on paper manuscripts can be removed by application of certain chemicals. The chemical to be used depends on the type of stains:

1. Stains caused by adhesive tapes - benzene
2. Deposit of dried gum - hot water
3. Lacquer - acetone
4. Rubber deposits - carbon-di-sulphide
5. Wax stains - toluene
6. Fungal stains - ethyl alcohol

- | | |
|-----------------------|--|
| 7. Tea, coffee stains | - potassium permanganate followed by oxalic acid |
| 8. Rust stain | - oxalic acid |
| 9. Oil stain | - benzene or toluene |

Paper manuscripts sometimes contain different sized sheets kept as separate leaves without binding. While handling, their first and last sheets get damaged. To prevent the corners of such manuscripts from bending, four or five leaves of unwritten paper are taken and glued together using acacia gum to form a thick binding board. Later on wooden boards, paper made of wood pulp that is acidic or card boards made of raw material with acid content were all used as binders. If we use acidic card boards, or brown sheets, or newspaper for protecting manuscripts, acidity from them seeps into the manuscripts under them. This causes colour changes and brittleness. Traditionally repair work of damaged paper manuscripts was done by using paper of the same type and with neem or acacia gum used for adhesion.

Preservation Using Technology

The saying, ‘Necessity is the mother of invention’ is true in the case of protection techniques that are new and they differ in various countries. Scientific methods of protection include the use of newly discovered chemicals and materials. It involves selection of the right protective methods by considering the nature of the manuscript’s material and the causes of their damage. Advancement of science has led to an increased usage of chemicals. They must, however, be used by considering factors like differences in climatic conditions and the nature of the manuscript material. Scientific conservation methods also

mean reprographic and duplication techniques like microfilming, photography and electronic digitization techniques.

Lamination

Severely damaged manuscripts require special repair modes. One such method is lamination. In this process, the damaged pieces are first cleaned. After that cellulose acetate paper, 2 cm, larger than the manuscript is kept both above and below the manuscripts. Over that, fine tissue paper is then placed both above and below. The manuscript is then subjected to heating up to 70 degree Celsius. The cellulose acetate layer melts and tissue papers stick to both the sides of the manuscript. The same method is also adopted without heat application. Instead of heating, cotton dipped in acetone solution is applied over both surfaces. Acetone penetrates through the fine tissue paper, reaches the acetate layer and converts into gel form. The acetate paper then turns like glue and sticks to the paper. In this type of lamination, the laminated manuscript becomes stiff and strong, but the characters turn slightly dull.

Lamination by heating causes damage to manuscripts. Today, lamination is done commercially at lamination centres which use polyester laminating sheets. In this process, manuscripts once laminated cannot be de-laminated. This process is irreversible. The laminate gets scratched due to sharp micro particles such as sand. They are also affected by climatic variations. The laminate undergoes colour changes due to heat and light. Because of these disadvantages any irreversible lamination is not preferred for conservation of manuscripts.

Encapsulation

To handle damaged manuscripts and to preserve repaired manuscripts, both palm leaf and paper manuscripts are

encapsulated. After encapsulation, damaged manuscripts can be freely handled. For encapsulation, the damaged manuscripts are first cleaned and de-acidified. Acid-free polyester sheets are cut to a size 1 cm larger than the manuscript's dimensions. Adhesive tapes, with adhesive on one or both sides are run all along the upper and lower periphery after removing the air pockets trapped inside leaving some space in the corners for air ventilation. In Western countries edges are sealed using ultrasonic pressure. In this method no heat is used. The polyester sheet spread evenly over the surfaces of the manuscripts inside prevents further damage. Encapsulation is reversible. At any time the manuscripts inside can be retrieved by cutting and removing the polyester sheet.

Polyester sheets contain very fine pores which enable “breathing” of the manuscripts inside and adapting to the climatic changes outside. Moreover such manuscripts are not affected by dust, water, heat and careless handling. Encapsulated manuscripts, however, cannot be bound together like books with string or rope. So they can be arranged in serial order and stored in box containers. Encapsulation is an ideal method of conserving damaged manuscripts.

Copying

Reproducing manuscripts through copying has been an age-old practice. Thanks to the custom of making copies, we have survival to this day of some very ancient text. High variations in weather conditions make it virtually impossible to preserve palm leaves for more than 400 to 500 years. It had been the practice to make copies of deteriorating manuscripts by a competent scribe, thus saving the texts from extinction.

The three thousand year old work of Sanskrit grammar was written by Panini in 10th century BCE and *Tolkappiam*, a Tamil grammar was written by Tolkappiar in 8th BCE. The *Tolkâppiyam* is a work on the grammar of the Tamil language and it is the earliest extant work of Tamil literature and linguistics. Several such works have thus been saved from loss. Not only damaged manuscripts but also the spoken words of wisdom uttered by learned have been copied down by rulers, men of wealth and educationists. Some rulers have made gifts of books along with other royal gifts.

It has been the practice of the head of Jain *mutts*, to make multiple copies of important manuscripts by groups of pupils and then hand them over to important libraries and teachers. Absolute care was taken to ensure that no errors crept in while copying. Their method of copy making has been described as follows: To make copies of a text, a number of blank leaves, not less than the number of pages in the original, would be readied and handed over to every one of the student-scribes. The master would then read out while the students record. If the master takes his eyes off the book to glance at students he may miss out words or lines. So, as the teacher reads out a line, students would write it on. As they complete copying of that line, an assistant would ring a bell and then the master would read out the next line. Such was the care taken to make faithful copies.

Making copies was an easy way of saving a damaged text. Such saving was done in the past by kings, people of wealth, and temple officials who hired professional scribes for the job. The credit goes to these professional scribes for saving many of the texts from extinction. It is essential that a scribe is well-educated and knowledgeable. Otherwise errors of content would

creep in during copying. Errors of spelling and content may occur in the original text itself as a disciple makes notes of his mentor's oral discourses. And these errors are perpetuated when such erroneous originals are duplicated. Such errors come to light when we make a comparative reading of various originals of a text of a particular title. So the copyist needs to be a knowledgeable and responsible person. Duplication by copy-writing of texts is going on even today in some libraries. Research scholars and academics are still making out paper copies of palm leaf originals.

Microfilming

Making draft copies of originals may lead to inadvertent missing out of words in the original. Sometimes the scribe may copy wrongly due to lack of competency in the subject of the work being copied. To overcome these shortcomings and for easy reproduction of the originals, technology has come to the rescue. One such technique is microfilming. Since it is a very efficient method, it has seen rapid developments and is used in various sectors. Its usefulness to libraries and museums is immense. Microfilming technique was invented in 1870 by the Parisian photography expert, Rene Dagron. It was put to a wide use in New York in the 1920's. Discovering the marketing potential of this technology Eastman Kodak Company in U.S.A., made mass production of rolls of 16 mm microfilm and sold them worldwide. Till the 1960s it was made use of in trade and banking sectors after which it gained currency for conservation of all sorts of documents. Microfilming is a dependable method. Any number of microfilm copies can be stored in various venues. It requires very little storage space and is very lightweight. It cuts down frequent and repeated handling of the originals. Any number of copies can be made from it. Very old books and

dailies are archived in Western countries in microfilm. Microfilm is available in rolls or card form

Microfilm rolls of 16 or 35mm width come in 100 feet lengths. Each roll can record 600 to 650 frames and each frame can capture two pages. Microfilm copies have a life of 200 to 300 years if they are kept rolled in spools and stored in temperatures between 18 and 24 degrees Celsius, and between 40 to 45% R.H. Like microfilms, microfiche and micro cards were also in use. Each microfiche strip is of 105mm by 140mm size and contains 96 frames. 182 pages can be stored in a square. But very few libraries in India have microfilming facility. The Indira Gandhi National Centre for Arts (IGNCA) has implemented conservation programme of manuscripts in microfilms with a view to holding microfilm copies of all palm leaf manuscript collections in all the libraries of the country. Under this scheme, all palm leaf manuscripts in the major libraries of India are captured in microfilm. The University of Chicago Library microfilms and stores copies of all books published in South Asian and Southeast Asian nations.

Digital Conservation

Electronic medium has become a great mode of preservation today worldwide. Manuscript repositories are digitally scanned and stored and multiple backups made by libraries everywhere. National Library, Kolkata preserves its manuscripts and books in digital format. Under the National Mission for Manuscripts scheme, the Linguistics department in Madras University has undertaken digitization of all manuscripts on the Siddha system of medicine held by manuscript libraries all over the state of Tamil Nadu. The Department of Manuscripts of the Tamil University in Thanjavur, likewise, is in the process of creating electronic copies of its manuscripts. Thanks to digital

storage, a large library can be contained within a small box, and through the internet can be accessed from around the globe.

Manuscript Writing

Some Jain *mutts* have taken up creation of copies of their old Jain literary and religious manuscripts in their original form on palm leaves by employing modern scientific means. If properly maintained palm leaves can be preserved for 500 years and paper manuscripts for 300 years. Microfilms and electronic copies in floppy, CD, VCD, DVD's have a life of a mere 20 or fifty years and hence several Jain *mutts* are making copies of their manuscripts on palm leaves and handmade paper. A certain Jain Devastanam in Ahmedabad is making copies of their manuscripts on hand made paper. Besides they have also undertaken single-side copying on palm leaves.

Manuscript Preservation in the West

The British Government has banned the use of certain chemicals, so chemical-less conservation is generally done. Manuscripts are kept there, each one in a separate box made of acid-free cardboard. Damaged palm leaf manuscripts are kept sandwiched between polyester sheets slightly larger than the manuscript's dimensions and their edges sealed by ultrasonic pressure. These encapsulated manuscripts are in turn preserved in cardboard boxes. British libraries have a limited number of manuscript collections and these are protected with utmost care. One more damage-causing factor of manuscript is the oxygen present in the air. In Australia, oxygen present in manuscript show cases is expelled. It is stored in oxygen-less environment. An iron-based powder used as oxygen absorber, its commercial name being "Ageless," is used for this kind of preservation

●

CHAPTER VII

MANUSCRIPT COLLECTION AND CONSERVATION AWARENESS

Knowledge gained by experience has been recorded in writing by our forebears in India to ensure its availability to successive generations. Such manuscripts meant for the people at large were stored in temples, religious *mutts*, and in the home libraries of educationists, medical men, and astrologers. In these libraries, the collections were compiled, stored in proper sequence, indexed, and copies made and handed over to those who needed them. Historical evidence reports of manuscripts gathered and collections made by rulers, and also the practice of obtaining books as ransom by a victorious king from the defeated one, along with gold and other wealth.

Ancient Manuscript Libraries

Libraries for preserving manuscripts had been in existence in Egypt, Rome, China and other countries. These libraries were mostly situated in temples, palaces and community halls. Archaeological evidence reveals that the Sumerians had established royal and religious libraries, as early as in 2700 BCE. Some 30,000 manuscripts, written on baked clay tablets were discovered in archaeological excavations in an ancient library site at Tello in Iraq (Mukherjee 75). Writings on clay tablets with pictorial scripts on it are called cuneiform writing. The Babylonian Civilisation is one of great historical importance, and archaeological evidence reveals the existence of libraries in Babylonia. Ancient clay manuscripts discovered at

archaeological sites there are being preserved in the British Museum. Historians say that in Nineveh, the ancient capital of Assyria, its ruler Ashurbanipal had established a library of 20,000 clay tablet manuscripts and even had an index of holdings, prepared for the first time. This library was destroyed by war in Assyria but the surviving manuscripts have been excavated and preserved after 2000 years. Historians also vouch the presence of papyrus libraries in Egypt. Papyrus manuscripts belonging to 300 BCE and preserved in clay jars have been discovered. As in Egypt, in Alexandria a library of 700,000 manuscripts was established by Julius Caesar. The librarians of this library were highly learned men. Between 197 to 159 BCE a library was founded in Pergamon by Eumenes II. It is said to have housed about 200,000 manuscripts. A famous library was established by Cicero in Greece between 106 to 43 BCE. Likewise, in Rome, public libraries were started in 4th century CE and handed over to the care of temple priests.

Manuscript Libraries in Ancient India

The presence of libraries preserving manuscripts in India has been revealed in several researches. Libraries were maintained by kings and religious scholars who valued the growth of art and religion. They promoted the writing of literary and religious texts and took care to preserve them. Archaeological excavations in Central Asia had thrown up artefacts and manuscripts belonging to India. During ancient times foreigners came to India not only for trade but also to acquire learning. These scholars took with them thousands of these manuscripts while going back home.

Temple Libraries

Temples the world over had been repositories of manuscripts and temple priests had been the librarians. This is proved by the existence of libraries in temples of several places of India. They were destroyed in religious strife, and by rulers

belonging to other religious faiths. The surviving manuscripts are preserved today in manuscript libraries.

In Tamil Nadu, temples had been excellent centres for promoting social growth and well-being. The temples had been the epicentre around which spread every village and township. Temples played the multiple roles of charity institution for helping people, a venue for cultivating spirituality and mental peace, the theatre of art that provided entertainment to people, and the library for housing written treasures. They provided a platform for discourses on legends, literature and religion for guiding people towards righteous living. For these purposes, several temples had *mantapams* [halls] to seat audience and for performance of dance and drama, and repositories for manuscripts.

The *mantapams* in temples used for preserving manuscripts were then known as *Tirukkaikkotti*. *Tirukkaikkotti* was constructed during the Pandya period (6th to 10th century CE) for the purpose of the recitation of devotional hymns. A stone inscription in the southern wall of the Siva temple in Sirkazhi town in Tamilnadu mentions the maintenance of a *Tirukkaikkotti*. Likewise, inscriptions in *Tiruveezhimizhalai* and *Tiruvusattanam* temples also make references to *Tirukkaikkotties*. Temple inscriptions carry information on libraries that had been functioning in those temples. South Indian temples in Kazhugumalai, Sringeri, Kanchipuram, Cheranmadevi, Sri Ranganatha, Thanjavur and Chidambaram have stone inscriptions that attest to the existence of libraries in the temple where manuscripts were preserved (Gurumurthy 161).

In Karnataka, Nagavi village near Wadi town in Gulbarga district has the Aravattu Khambada Gudi stone inscription. These inscriptions speak of the public institutions established by Raja Narayanan, the Chalukya king who ruled that region

and his minister Madhusoodhanan. It is stated there that *Ghatikasala*, the residential college established by them had 250 students, 6 teachers and 6 librarians. The town of Kanchipuram had been the capital city of several rulers since 500 CE and even earlier. The Chinese visitor to India, Hiuen Tsang (Yuan Chwang) mentions the existence of a famous university here. Copper plate and stone inscriptions mention the existence of a world famous Sanskrit college here during the Pallava period by name Kanchighatikai.

The Varadarja Perumal temple of Kanchipuram has a stone inscription which states that a Vaishnavite devotee had established a *mutt*, in which he had made provisions for manuscript preservation. So, one can understand that Kanchipuram had been a centre of growth for learning and the arts. A stone inscription in the Drowpati Amman Temple of Cheranmadevi, near Ambasamudram, in Tirunelveli District of Tamil Nadu, mentions the existence of a library in the temple. In the Srirangam temple at Tiruchi, a stone inscription of the fourteenth century, inscribed during the reign of Veerarama Nayak, found in the room next to the *Tiruppani arai* (Maintenance Room), mentions the existence of Sarasvati *bhandar* there.

During the 7th century CE the temple of Lord Nataraja in Chidambaram was a much renowned shrine. It had been a treasure house of art and a repository of documents. Its temple inscriptions attest to the presence of a library in the premises, where twenty scholars were at work making comparative studies of Sanskrit and Tamil texts and copy making. The existence of a document archives, known as *Aavanakkalari*, is also mentioned.

Saints Gnanasambandar, Thirunavukkarasar and Sundarar, champions of the Saivite faith, who lived prior to the 7th century CE, had composed a great number of devotional hymns collectively known as the *Tevaram*. Manuscripts of these hymns

had been archived in the Sarasvati Bhandar in the Chidambaram temple, but left unopened, forgotten for ages. Nambiandar Nambi of Tirunaraiur near Chidambaram came to know of their existence by the grace of Polla Pillaiyar, the name of the Lord Ganesa, a deity in Tirunariyur temple. Accompanied by the Chola King Rajaraja, Nambi approached the Dikshitaras, the temple priests of Chidambaram, to retrieve them and to make a compilation. The priests replied that only if the trio of saints, the authors of the hymns, arrive, the sealed doors of the archive room would be opened. The idols of the trio were then taken in procession and the room was then opened. Ant hills had formed over the long untouched manuscripts. Several pots of sesame oil were poured over the manuscripts to clean and prevent them from crumbling. The *Tevaram* hymns were retrieved and thus “rediscovered.” This story is recorded in stanzas 20 and 21 of “Tirumurai Kanda Puranam” chapter in the literary work *Periya Puranam*.

Kings and rulers thus had taken great interest in establishing libraries and preserving manuscripts. The Chidambaram temple not only had a library but also had “readers” of texts whose duty was to read out texts for others. A 12th century stone inscription of Pandya King Sundara Pandiyan mentions the name of one Swami Thevar, who was employed to maintain library and endowments of agricultural lands donated to raise funds for library maintenance.

Notes of Chinese Travellers in the Historical Past

Fahien came to India during the 6th century CE and studied Sanskrit and Buddhist religious texts staying on for 16 years. He mentions the existence of good educational institutions and library facilities in India. He also mentions having had to employ several scribes for making copies of damaged manuscripts and those which had to be duplicated for sending abroad or to other

libraries. We come to know from various records that during his return to China he carried in 520 bundles palm leaf manuscripts.

The third Chinese visitor to Ithsing undertook studies in Nalanda from 675 to 685 CE. He describes in his notebook how the Buddhist monks there devoted themselves all the time to the study of scripture. King Harsha, also known as Harshavardhana, an Indian emperor ruled North India from capital Kanauj, gifted several horse-loads of manuscripts to Ithsing.

Awareness of Conservation of Manuscripts

The Jains had been contributing considerably for the growth of religious literature in India. During 160 CE the first Jain Sangam (a literary academy) was established in Patalipura (Near present day, Patna, capital of the Bihar State). The second and third *sangams* were established in 825 and 980 CE respectively. Writings created by the 16 Jain *sangams* were safely kept in different venues. These repositories were called *jnana bhandars* and were situated in -Patan, Surat, Gambay, Vallabi, Ahmedabad and Bijapur.

Siddaraja Jayasimha Deva (1094-1143 CE) was a notable king among the Chalukya rulers. Reputed for his missionary zeal for the library movement, he had added to the Anahilpataka library the books of Bhoja Raja, the conqueror of Malwa had held in his possession. Another noteworthy king, Kumara pala (1143-1172 CE), had established 21 libraries in several places. His work the *Kumarapala Prabhandha* mentions his library activities (Tillainayagam 185). The King Bhoja Raja (1010-1055 CE), who ruled from Dharanagara (modern Dhar), established a college there and started a library in it. Thus, we learn of several kings contributing to the cause of manuscript preservation.

Buddhism and Manuscript Care

Buddhism flourished in India from 3rd to 7th century CE. Buddhists, like the Jains, valued books and their preservation. The libraries which they had in the Tamil country were called *Sezhunkalai Niyamam*, which existed in several parts here. The epic *Manimekalai* mentions the existence of such a *Sezhunkalai Niyamam* in Madurai (Chapter 25, Verse 139). The well-known 2nd century CE Buddhist religious head Nagarjuna had created a five storeyed structure. It is located in Nagarjuna Nagar, Namburu, in the northern part of Guntur city of Andhra Pradesh. It housed a library on the fifth floor. This library had a *tripitaka (a literary forum)* consisting of a great number of literary scholars. This is recorded by the Chinese visitor Fahien.

In India, Universities in Kashi (Varanasi), Taxila (near Rawalpindi in Pakistan), and Panchalam had libraries in their campus. The Taxila University Library takes the credit of being the first ever University library. It had existed in 414 CE as a very large library with writings on religion, literature, medicine and philosophy.

The University of Nalanda, founded by Kumara Gupta had become a seat of religion, learning and culture, that its fame attracted people from abroad to pursue study here. Its library was known as Darma Ganja; its three buildings were named Ratnasagara, Ratnadadhi and Ratnaranjaga, of which the Ratna Thadhi is said to have had nine storeys.

Brick-work compound walls had been raised around the library buildings of universities and *viharas* for protection. The Buddhist text written in Sanskrit titled *Manjushri mula kalpa*, reports the invasion of India by a foreign King who came via Kashmir and destroyed Buddhist monasteries and killed their monks. Nalanda University had been one of the targets of his

attacks. The fame which this university and its library had gained overseas is recorded by the historical, foreign researchers Hiuen-Tsang, I-Tsing, Taou-Hi and Hwui-Nieh (Thillainayagam 201).

Conservation Awareness and Literary Writings

Like the Jains and the Buddhists, leaders and kings of other religious faiths had founded forums for the care and protection of manuscripts in Tamilnadu. The Pandya rulers of Madurai had established the First, Middle and Last Tamil Academies (*Sangam*) for promotion and growth of learning, language and religion, and had several books written by these *Sangam* poets. Their writings have captured the life style, culture, language, literature and religion prevailing in those times. The earliest available among such writings is the *Tholkappiam*, which has been dated to 6th century BCE or prior to it (Thillainayagam 138).

Though *Tholkappiam* is a treatise on grammar we find recorded in it the customs and habits of life of ancient Tamils – the history of their language and its excellence, refinements of its grammar. Various Tamil texts, cited in *Thokappiam* and commentaries on it, have been lost. Their originals or later copies are not available (Thillainayagam 136).

Some meta-texts exist that deal with the importance of books and methods of their care. For example, the Paushkara Samhita, written in the form of a dialogue between Brahma and Vishnu, contains information on how to establish a library, collect books, preserve them and the need to build library buildings with stones that do not absorb moisture, and doors to be made out of iron and other metals. Its walls are to be painted white, and the libraries are to be housed in holy places like temples to which all people have access. To protect manuscripts from pests, leaves from certain herbs growing on river banks

should be used (Thillainayagam 207). *Das Bodh* is a 17th century text on Vedanta, consisting of the teachings of Samartha Ramdoss to his disciple, Emperor Shivaji. This work contains information on the writing of manuscripts and their preservation.

Role of *Mutts* and Monasteries in Manuscript Preservation

Religious *mutts* played a role not only in the propagation of a religion but were also centres of learning and producers of religious manuscripts. Pupils from different parts who had come to stay in *mutts* to pursue their studies acted as scribes of texts. Religious and language pundits were invited as guests to *mutts* to carry on research and to author books. Religious *mutts* have contributed to the care of manuscripts too. *Mutts* in various parts of Tamil Nadu had such book repositories.

In course of time manuscripts preserved in many of these *mutts* were lost due to negligence, natural calamities, and lack of awareness on the need for conservation. Due to lack of facilities for protection and very little use of their manuscripts, some of these *mutts* handed over their collection to modern manuscript libraries for their upkeep and care.

Role of Temples

Temples also played a role as manuscript repositories. The Digamber Jain temple in Bangalore preserves even today more than 400 palm leaf as well as paper manuscripts. This author, while on a visit there, found them piled one over another. When it was pointed out to them that manuscripts stored in this manner get stuck to one another due to pressure of their own weight and may also result in their bending, they started keeping them separately.

Manuscript Care in Sri Lanka

Collectively known as the Arya Chakravartis, Tamil kings ruled over Jaffna region of Sri Lanka. They were friendly with the Pandya kings. They had established Tamil *Sangams* (academies) and three libraries that were called *Sarasvati Kolayam* (Ilankumaran 48). The existence of libraries in Sri Lanka from the first century onwards has been recorded. The wish to possess books had made many in Sri Lanka to get them copied by scribes and preserve them.

The Buddhist monasteries gave a great priority to copying and preservation of manuscripts for religious propagation. Rules for preservation of manuscripts were also included among the codes of conduct for Buddhist monks. They have been listed by John David in his book on Buddhism

1. An idol of Buddha is to be treated like a living Buddha, with all deference.
2. Religious books are to be venerated and protected.
3. All elders are to be treated like one's parents.

The *potigula*, a manuscript store room that existed in every temple in Sri Lanka was accessible to the public. The caretaker of the library in it was called *Bhandara pothakin* (Piyadasa 14).

Collection of Manuscripts

Collection of manuscripts is an important part of conservation of manuscripts. Generally manuscripts were stored in temples, palaces, homes of men of learning, traditional medicine men and astrologers. What still remains with them after their loss and destruction are collected and conserved. The task of manuscript collection and compilation had been going on since the Sangam period 3rd BCE to 2nd CE. Several kings and pundits in the past had carried on this task, out of

their love for learning and concern for their preservation. Manuscript collection is the first step in the task of manuscript conservation. Evidence exists for manuscript collection by rulers since the first century CE. Poets of the royal court of Tamil kings had engaged themselves in collaborative writing and compiling of books (Thillainayagam 137). Such books exist still and are available to us today. Not only kings in Tamil Nadu but territorial chieftains, Zamindars and great poets have helped in preservation of manuscripts.

During the reign of Ragunatha Nayak of Thanjavur (between 1600 and 1630), the Sarasvati Bhandar was established to house the manuscript compilations of the works of the court poets. Manuscripts were also cared for under the Vijayaraghava Nayak rulers who came later. The Marathi rulers who succeeded them still later also developed this repository. The Marathi King Serfoji II added up books and manuscripts and gave the name 'Sarasvati Mahal' to the erstwhile 'Sarasvati Bhandaram.' This library is at present called 'Thanjavur Maharaja Serfoji's Sarasvati Mahal Library.'

King Serfoji had purchased and added to this collection manuscripts written and collected by scholars of various languages. Where he could not obtain manuscripts he had dispatched competent scribes to copy them out and added them to the collection. There is a record of a sanction order for payment of Rupees 100 from the king's treasury to the person sent by Bhandara Sannidhi (Kasi Bhandaram) of the Tirupanandal Mutt near Kumbakonam in Tamilnadu for obtaining copies of manuscripts from Varanasi and other northern parts. This emissary had travelled to Kasi (Varanasi) in 1820. In the libraries that lay enroute, he made copies of books that were not available in his library back home. He had collected hundreds of such books on his way. Even now the outer cover of some of the manuscripts in the Sarasvati Mahal

Library carry's the legend that the manuscript was collected during the trip to Kasi. Another note, found as a postscript to the Sanskrit manuscripts *Patanjali Sutra*, states that the text was purchased by King Serfoji and dispatched from Kasi. Mention is made in the Modi Documents (day to day accounts and other official records written in Marathi language with a special script Modi, a shortened form of the Devanagiri script) that King Serfoji II had appointed competent scribes for making additional copies of the texts in the library and had paid them by reckoning the number of alphabetic letters copied.

Until Serfoji II ascended the throne, the Sarasvati Mahal did not have an index of its collection. Its first index was prepared under his orders, one for palm leaves and one for paper manuscripts. The index of Sanskrit manuscripts has 18 subdivisions and under each subdivision information on every individual text is recorded – title, author, number of leaves and whether the complete text is there. King Serfoji II not only increased the collections but had also seen to their proper care and indexing.

Manuscript Libraries in the 19th Century

The British, who arrived in India during the 18th century, evinced a keen interest in our art and culture and undertook collection of our cultural artefacts. Robert Chambers introduced Indian Sanskrit writings to the West. The manuscripts collected by him were purchased in 1774 by Germany and included in the Imperial Library in Berlin. After Robert Chambers several Western scholars learnt the Sanskrit language and undertook English translations of important Sanskrit texts. A pioneer among them is Sir William Jones who, in 1789, rendered the epic *Shakuntala* in English.

Several of the Indian cultural artefacts and manuscripts were taken away out of India during the 18th and 19th centuries by Christian missionaries, civil servants and tourist visitors. These manuscripts are still preserved in important libraries of Europe. Christian priests also played a part in collection of manuscripts. Tamil Nadu was no exception to this activity and noteworthy among them were Roberto de Nobili in Madurai and Bartholomaeus Ziegenbalg in Tranquebar. The libraries which they had established had manuscript collections. Christian religious institutions in Madurai, Palayamkottai and Shenbaganur still preserve the manuscripts that had been collected by Christian priests. More than 2000 dated manuscripts of palm leaves and paper are still preserved in Jesuit Archives, letter correspondences by Christian missionaries till 1620. In this context, the name of Colin Mackenzie deserves mention. He came to India in 1772 as an official of the engineering department of the British East India Company. Wherever he happened to visit in his line of duty he collected manuscripts, copper plates and such rare articles that he found. His entire collection was purchased for ten thousand pounds by the East India Company and had an inventory of them prepared in 1828 by H.H. Wilson. A part of the collection was taken away to England but what remained is preserved by the Tamil Nadu government in the Oriental Manuscript Library under the title the Mackenzie Collections. Along with it are also preserved the collections of Mackenzie's contemporaries who had been serving in Chennai. They are those of William Taylor, C.P. Brown and Leyden.

Manuscript Worship

To inculcate the idea of cherishing manuscripts the icons of Sarasvati, the goddess of learning, Dakshinamurti, Brahma and venerated poets, were all portrayed in the posture of holding

manuscripts in their hand. For the same reason the final day of the annual Navaratri festival is dedicated to the worship of books and is called ‘Saraswati Puja.’ On that day all books at home are taken out, cleaned and rebound well. Whatever be one’s profession the custom of taking care of books on that day of the year is unfailingly observed. Private collections of manuscripts in individual homes have withstood ravages because annual maintenance jobs were undertaken on Sarasvati Puja day. This include replacing new cloth and tying cords, making copies of deteriorating manuscripts, inking manuscripts for better visibility of characters, and preventive measures against pest infestations (Swaminatha Iyer 143). This tradition is still being followed today. If not for it, a number of valuable manuscripts would have disappeared, along with the thoughts of the wise recorded in them, as a prey to termite attacks. The practice of worship of books played a major role in the protection and survival of manuscripts

As in South India, North India too has traditions of worshipping books and caring for manuscripts. The libraries created by Jains were called Gnana bhandarams, that is, repositories of sacred knowledge. To propagate the reading of these books, annual festivals of *Gnanapuja* were celebrated. One event of the festival was the making of thousands of copies of manuscripts that are in deteriorating condition, and given away free to those who had need of them.

Copy Making

The practice of copy making had been in existence from time immemorial. Several books of the past that we still enjoy reading today owe their existence to this practice. A copy was made as soon as manuscripts reached a damaged condition. This practice was called copying, manuscript revision and such terms. While copying, the changed script forms of a language,

existing at the time of copying, were adopted. The *Chitta Yema Vyakaranam* mentions that there were scribes exclusively for making copies of damaged texts. Trained scribes were appointed for the purpose by temple administrators and educationists. Scribes were required to possess sound knowledge and good education. Otherwise errors would creep in at the time of copying.

Errors and variations in a text also creep in while disciples in an educational institution take down notes of their mentor's oral teachings. When copies of these written notes are made these errors/variations get perpetuated. Thus we find several variations in the different copies of a single title. So scribes making copies from manuscripts have to be vigilant and diligent in their job.

Today, we have with us more than 2800 year old Sanskrit grammar work written by Panini. Likewise, 2600 year old Tamil work existing is the *Tholkappiyam*, an ancient work of Tamil grammar and other literary writings of the Sangam era (2nd BCE to 1st CE). They exist today because they were perpetuated in the past through copy making. Copies were made by the order of kings, men of wealth and academics not only for the survival of dying manuscripts but also for retaining written records of the spoken wisdom of the learned. Some kings were in the habit of including gifts of religious books along with other royal gifts.

Gifting of Books

Gifting of books have been done by making several copies for the purpose of their perpetuation. As a mode of promotion of the Jain religion it had been the custom to gift books on the day prescribed for worship of books. Kings too were in the habit of making gifts of books. Book gifting was called '*grantha dhanam*.' It is relevant to mention here that there was a saying that a book gift is the best gift. Noteworthy of mention is the

philanthropy of a woman named Attimabbe. In 10th century Karnataka, for the sake of religious purposes, she had made 1000 copies of *Shanthi Purana* by the poet Ponna for the purpose of gifting. Ponna (c. 950) was a noted Kannada poet in the court of King Krishna III (939–968 CE) of the Rashtrakuta Dynasty.

Passing on a skill that one has learnt to others and passing on copies of books that one possesses was commonly known as '*sastra daanam*.' The Vatapi stone inscriptions dated 568 CE speak of the gift of books (Vatapi, at present known as Badami, is a town in the Bagalkot district of Karnataka. It was the regal capital of the Badami Chalukyas from 540 to 757 CE.)

Preparing Index for Manuscripts

In addition to collecting and protecting, preparation of index can also be deemed as a part of the care of manuscripts. Indexing makes them accessible to users and so it is also a library job. For this purpose indexes have been prepared for manuscript collections of libraries as well as of individuals. An index is a ready reference to the number of books in a collection, their titles and their subject matter. Awareness for indexing had been there the world over since the ancient days. One of the oldest libraries, the Alexandria Library had an index of its manuscripts prepared by Callimachus.

After King Serfoji ascended the throne, a catalogue was prepared for the manuscript collections in the Thanjavur Sarasvati Mahal Library under the stewardship of one Gangadhara Bhat alias Sadasiva Bhat, a poet in the King Serfoji's court. Separate catalogues for palm leaves in 1801, and another for paper manuscripts in 1807, were prepared. Those were the very first catalogues of this library and also the oldest extant in India. Yet another index was prepared in this library between 1840 and 1845. After the death of the last Marathi king of Thanjavur in 1855, this library came under the

administration of the collector of Thanjavur. Under his orders yet another index was created in 1857. Once again, under the orders of the Governor General in 1870, Dr. A.C. Burnell, who served as Sessions Judge in Thanjavur, prepared an index of its Sanskrit manuscripts after perusing them for 3 years. It was published in London in 1880 in three volumes under the title, *Classified Index to the Sanskrit Manuscripts in the Palace of Thanjavur*. The following two scholars H.S.H.Count Noer, Prince Frederic of Scholes wing, Holstein and Gold Stucker has brought out details of these library manuscripts to the western countries (Burnell: Part I 5).

Manuscript Preservation during the Mughal Period

The Muslim rulers of India were able administrators and were learned men besides. They had their own palace libraries. The Mughal king Babur (1526 -30 CE) was a lover of letters and also a man of many languages. He never failed to make use of his library every day. He devised his own method of creating texts, which is known as the Babur style of writing. When he happened to visit Bengal, he had taken a librarian named Kvandamir with him for the purpose of book compiling. He also promoted illustrated manuscripts and set up libraries in a number of mosques (Kumar 24).

Gulbadan Begum, daughter of Babur, had set up a library for herself. She had authored a book Humayun Nama. Humayun, Babur's son too was a lover of books. He converted the palace of Sher Shah of Delhi into a library. Akbar (1556-1605 CE), who became king following Humayun, expanded the library of his predecessors and located it near the Octagonal Tower of Agra Fort (Thillainayagam 237). Likewise, Tippu Sultan, the ruler of Mysore, had a library in his palace. When the British defeated him in 1799 they took away his collections. The

Cambridge University Professor, Charles Stewart prepared a catalogue for it under the title *Descriptive Catalogue of Tippu Sultan's Library*.

Care of Manuscripts during the British Rule

On 10th May 1868, the Chief Pandit of Lahore Durbar, Pandit Rathakrishna, sent a letter to the Governor General of India, Sir John Lawrence, detailing the conditions of manuscripts and how to set it right. This letter was sent bearing in mind the neglect of manuscript protection in several places in the country. Likewise, one A.E. Gouch had submitted a report on the collection and protection of manuscripts. Based on this report, Administrative Council Secretary Stokes set up a plan for compiling and indexing of manuscripts. In it, he states: “We ought to do something for protecting manuscripts. It is not too late yet. The Indian weather and termites destroy manuscripts to terrible conditions. Besides, the numbers of families of pundits who can read them are dwindling. Youngsters are not inclined towards protecting or reading of manuscripts. If the government does not take any steps at this juncture to address the problem manuscripts cannot be saved”. A Government Order (No 4338-48) to implement the proposal was passed in Shimla dated 3rd November 1868. Accordingly a sum of Rs. 24000 was sanctioned to fund implementation of the proposal throughout India.

In the state of Bombay, Western scholars Dr. Buhler and Dr. Kielhorn undertook the execution of this mission. Mahamahopadyaya Hariprasad Sastri undertook this project in Calcutta. In southern parts of India Sanskrit manuscripts were in various scripts other than Devanagari. So, manuscript preservation was largely ignored here. We infer from this that in those times manuscripts written in Devanagari script alone were held in esteem.

On completion of a year after the commencing of this program, a report of 1869, and the Review Report of Oriental Research states: “The search for Sanskrit manuscripts was started all over India since the past one year, Professor Rajendra Meera in Bengal and Dr. Buhler and Dr. Kielhorn undertook the mission. Dr. Buhler had made an inventory of more than 600 manuscripts.”

This work was not undertaken in the Madras Presidency, for the reason that this Committee did not bring manuscripts of Sanskrit texts written in South Indian scripts under its purview and took up manuscripts of Devanagari script alone. But the Committee did not turn down A.C. Burnell’s Index. An index was made of the manuscript collections in the Mysore Palace Manuscript Library which was made accessible to the public. Dr. Buhler released the report of the progress of the Oriental Research Review Report in 1872-73. The report records the existence of more than 10000 Jain religious manuscripts in Cambay and Ahmedabad in Gujarat region. Buhler further states that 200 manuscripts were collected and that some among those manuscripts belonged to the 5th and 6th CE centuries. Among them, *Brihat Kalpa Sutra* is a dated manuscript, carrying the year and place of its inscription as 1278 CE in Cambay. Thus the British administration in India had taken up the task of collecting and indexing of manuscripts.

Though inventories of manuscripts in libraries and in private collections did exist, an indexing of the manuscripts in India and abroad in printed form was the index printed in 1807 in London (Katre 104). Following this and up to 1900 the indexing format was changed and was made more descriptive.

Cataloguing of Private Manuscript Collections:

Cataloguing of private and personal collections of manuscripts in the Madras Presidency comprising of the

southern states was undertaken by Gustav Oppert, who had been a professor in the Presidency College of Chennai. It was published under two volumes in 1880-1890 under the title *Lists of Sanskrit manuscripts in Southern India* (2 Vol. 1880-1885). It contains a district-wise, and village-wise list of names of people holding manuscripts, with names of 250 owners of manuscripts and details of more than 20,000 manuscripts.

As a sequel to his work, an enumeration of manuscript holders who were left out in his *Lists* was taken up by the archaeologist and epigraphist, Hultzsch. His work of index, titled *Report on Sanskrit Manuscripts in Southern India*, came out between 1895 and 1900. His list has entries of 2190 manuscripts and names of 48 families.

Theodor Aufrecht, making use of the indexes of 98 libraries, brought out an integrated 3-volume index of Sanskrit manuscripts under the title *Catalogus Catalogorum* (It is a union catalogue of Sanskrit manuscripts available in various libraries). *A New Catalogus* by Sir Aurel Stein, including the indexes of some 400 more libraries not yet covered, has been brought out by the Department of Sanskrit, Madras University. This work is still continuing.

Manuscript Editing

The prime purpose of manuscript care is to make available to the future generations what was left behind by our past generations. Therefore, manuscripts are being brought out in print form. This is called manuscript editing. Palm leaf manuscripts dealing with literature, grammar, medicine, astrology and other subjects were edited and brought in book form for readers at large. The editing and publishing of manuscripts is no easy task. Mere language competence is not sufficient for it. The one who takes it up should possess not

only a sound knowledge of that language, but should also be familiar with the history of the language, history of its script, script styles employed in manuscripts, prosody, metre etc.

Publication work, undertaken by literary and language research institutes in various parts of the country, began in India from the beginning of the 19th century itself. The earliest edition of a Tamil literary classic available is the 1812 edition of the text of *Tirukkural*, printed at the *Maasa Dhinacharidai Achu Koodam*, Chennai. Till 1867, only Christian missionaries had printing presses and they published only Christian literature. But this is the first book of non-Christian literature that was published in a Christian printing press mentioned above. In the latter half of the 19th century, several notable persons had undertaken efforts to publish Tamil manuscripts. Among those who deserve special mention here are – Ramanuja Kavirayar, Arumuga Navalar (1822-1879), Visaka Perumalaiyar, Lord True, Egmore Venkatachala Mudaliar, Sabapathi Mudaliar, Kalathur Vedagiri Mudaliar (1785-1852), S.V.Damodaram Pillai (1832-1901), and U.V. Swaminatha Iyer, who were all pioneers.

Literary research today has developed in many directions and become multi-disciplinary. Such growth is due to those noble souls who published and made available to all, manuscripts of the past in simplified book forms. We sometimes fail to access books that were published a century ago. Therefore, it becomes all the more essential to conserve and to care for not only original manuscripts but also later commentaries of these books and manuscript copies of them.



CHAPTER VIII

SCENARIO OF CONSERVATION ACTIVITIES

India has the largest collection of manuscripts in the world. In various languages, they are the store houses of information of Indian art, literature, religion, history and other sociological fields.

Manuscript Libraries

Manuscripts have been destroyed in religious strife, wars between rulers, and changes in social environment caused by changing times, natural disasters and by other causes. What have survived such destructions is now being preserved. Noteworthy among them with a long history are but a few. They are:

1. Sarasvati Mahal Library, Thanjavur (from the beginning of the 17th century)
2. Sarasvati Bhavan Library, Varanasi
3. Government Oriental Manuscript Library, Chennai
4. Adyar Library and Research Centre, Chennai
5. Asiatic Society Library, Kolkata

In addition to the above, other well-known libraries were all started after the beginning of the twentieth century. Several libraries were set up by lovers of art and language who had undertaken the task of collection and listing of manuscripts for the British government which started in 1868. More than 300 such libraries in India have been identified and enumerated. It has been reckoned through a survey that manuscripts taken to

the West from India and other South East Asian countries are housed in about 80 libraries;.

Present manuscript repositories of India maybe categorized under six heads:

1. Government or quasi-government undertakings
2. Libraries of educational institutions.
3. Libraries of research institutes
4. Repositories in religious *mutts*
5. Others, such as holdings by individuals
6. Institutions abroad holding Indian manuscripts.

Conservation Survey

A study-cum-survey was undertaken in 1990 by INTACH, Lucknow, regarding the status of conservation of manuscripts, books and documents. It was undertaken as per the directions of a consultative committee headed by O.P. Agrawal and other experts. The survey covered libraries in Uttar Pradesh and manuscripts repositories in other places as well. Based on the survey venues of manuscripts storage were classified under three heads:

1. Those having full-fledged conservation facilities and trained staff.
2. Those with limited conservation facilities and fewer trained staff.
3. Those without any conservation facilities and run by unskilled staff.

The objectives of the survey were the following:

1. Enumeration of manuscripts

2. A study of their condition
3. A feedback on existing conservation facilities by contacting qualified staff serving there
4. Updating those staff with the latest conservation methods.

The survey covered the states of Gujarat, Goa, Tamil Nadu, Uttar Pradesh, and West Bengal. The survey experts had observed that while collecting data regarding the condition of manuscript conservation and staff facilities those in charge of institutions were reluctant to part with actual facts for fear of revealing the deplorable conditions prevailing in their institutions. The survey was made by actual visits to 30 institutions and by obtaining information reports from 38 important manuscript libraries. Based on the survey they submitted their findings as follows. Since in northern India manuscripts are mostly on paper their findings pertain to damages caused to paper manuscripts:

- Papers losing their strength
- Papers with acidity present
- Bookworm attack
- Fungal growth
- Dust deposit
- Fading of ink characters
- Manuscript leaves sticking together
- Stains caused by glue and other substances
- Keeping damaged manuscripts tied up bundle
- Wrong manner of shelving or stacking manuscripts
- Lack of ventilation
- Insufficient lighting

- Part-time air-conditioning (during work hours only)
- Wrong methods of repair work
- Damages caused by the ink used
- Wrinkling of paper manuscripts
- Colour changes
- Glue losing its adhesiveness
- Excess use of glue

When enquiries were made about the requirements and needs of these libraries/institutions the following factors came to light. The survey concluded that

1. Safe and proper facilities were required in several of them
2. Only 18 of the 46 institutions covered by the survey had all the adequate facilities
3. Only few institutes reported that they undertook use of insecticides, fumigation, wrapping manuscripts in red cloth, or using acid-free card board for binding manuscripts

Manuscript Rooms

To ensure longevity of life of the manuscripts they must be stored in rooms at constant levels of temperature / RH. Out of the 30 premises visited by the experts, twenty were found to have satisfactory storage rooms, four had air conditioning and only one had 24-hour air conditioning. Among those institutions from which information had been sought and obtained without visiting, the feedback information revealed that 14 of them had adequate facilities and qualified staff, 13 had inadequate facilities, and 19 had no facility at all.

This survey had the effect of creating awareness on conservation in manuscripts repositories among its staff and

administrators. The survey identified the following factors responsible for lack of protection.

1. Improper methods of storing
2. Lack of facilities for protection
3. Lack of trained/qualified staff
4. Lack of adequate funds
5. Non-availability of protective materials, leading to damage/ destruction of manuscripts

Requirements for Conservation

It is essential that the person handling the manuscripts should possess a sound knowledge of the manuscript material and its properties and characteristics, besides the knowledge of the factors that may cause damage to manuscripts. Proper storing, proper handling and proper and safe methods of shifting them from place to place should all be considered by the staff.

Most of the damages were caused because in the olden days manuscripts had been simply kept in temples and *mutts* without taking any protection measures. Lack of awareness and a lack of knowledge regarding protection of manuscripts among succeeding temple priests and *mutt* heads led to their loss.

Measures of Preservation

Protection of manuscripts from damages caused by various factors, their proper storage and handling — all need to be planned and executed. To identify and to provide such a planned protection, Dr. O.P. Agrawal enumerated the following points to be borne in mind and taken into consideration:

1. Lack of awareness regarding manuscript protection not only among the people at large and the workers handling manuscripts but also among the administrators managing these institutions.
2. Lack of properly trained conservation staff
3. Lack of funds for undertaking preservation measures
4. Lack of well-protected premises and improper methods of storing manuscripts
5. Lack of facilities to nullify factors causing damage
6. Lack of facilities for protection for originals but also lack of facilities for backup copies of manuscripts.

Thus, identifying the damage-causing factors, O.P Agrawal stressed the need for taking these factors into consideration in all planning and execution of manuscript protection measures. Though conservation measures went on at various places, in the absence of an integrated approach, it was done with whatever materials were naturally available in the vicinity. With the practical experience and information obtained from others our forebears undertook conservation of manuscripts. Such measures had neither any standards nor uniformity.

A conservation research wing was started in the Government Museum, Chennai, for preservation of manuscripts, in addition to other rare heritage objects. Following this, such centres were started in Archaeological Survey of India Laboratory, National Museum and National Archives in New Delhi, Indian Museum, and National Library in Kolkata.

After independence in India, several states created their own archives and museums, each of which had its own

conservation sections. But they all gave primary importance to articles and documents, while manuscripts received less attention. Only National Archives in New Delhi undertook scientific research on manuscript conservation.

The National Research Laboratory for Conservation of Cultural Property (NRLC) was established in 1972. Its aims were: to undertake research on conservation of cultural artefacts and manuscripts, to share techniques of conservation with institutions holding the collection of manuscripts, and to conduct training courses to their staff. In 1987, the Regional Conservation Laboratory was started in Mysore to extend the same facilities for the southern states. At present all important manuscript libraries in the country have their own conservation section. They also conduct training courses in manuscript conservation with the help of well-trained conservators.

The Conservation Centre of INTACH was established in 1988. At present it has developed and spread by starting its centres in five cities: New Delhi, Lucknow, Jodhpur, Bangalore, and Bhubaneswar.

National Mission for Manuscripts

This was established in 2003 by the Prime Minister of India to promote conservation of manuscripts in the various states of India. It functions as an independent Directorate in the Indira Gandhi National Centre for Arts, under the control of Ministry of Culture, Government of India. Its objectives are the following:

1. Conducting training programs for manuscript conservation, creating awareness of conservation, and providing help for setting up and organizing conservation courses/workshops.

2. Compilation of Manuscript details by advertising and calling for information countrywide from libraries, institutions, and private individuals all over India.
3. Publishing such compilations as books or making them available to the public on electronic media.
4. Imparting training to read the various scripts of Indian languages.
5. Setting up of a national manuscripts library in the premises of Indira Gandhi National Centre for Arts (IGNCA).

To achieve the above objectives, the Mission has identified and selected manuscripts libraries and institutions of note to provide manuscript conservation facilities to the manuscript libraries in their vicinity. This is a major objective of the Mission. This objective encompasses the following tasks

1. Making a census of the manuscript collections in the respective regions
2. Creating an awareness of manuscript conservation among the public in that region and providing the knowhow and counseling.
3. Giving short term training to those possessing manuscripts or working in repositories.
4. Motivating everyone to adopt traditional conservation techniques through simple means.

The tasks listed above are being implemented through its schemes.

Manuscript Conservation Activities

Manuscript Census

Undertaking census of all the manuscripts available in the country and enumeration is going on. The census covers

temples, palaces, religious *mutts*, educational institutions, museums and private individual holdings. As a result more than a hundred indices of manuscripts have been prepared by S.C. Biswas and M.K. Prajapati under this INTACH scheme. Moreover, by means of direct data collection statistics, more than 3.5 million manuscripts have been enumerated. In addition, about 60000 manuscripts in European countries and 150000 in the Asian nations of Nepal, Pakistan, Burma, Thailand, Sri Lanka, and Japan are kept preserved.

It is generally found that the manuscripts in libraries of educational institutions and those in private custody are poorly protected. Lack of facilities and lack of awareness are the two reasons for this situation. Several manuscript preservation methods have still not reached the people.

Training for Manuscripts Conservation

Two main contributory causes leading to manuscript damage and loss are lack of knowledge of manuscripts and lack of proper training. Two-pronged training has to be imparted – one for administrators of the institution holding the manuscripts and the other for its conservators.

Training for administrative heads should include an awareness of the importance of manuscripts, developments in the area of conservation, various conservation techniques, latest tools and implements of conservation, and an institutional brief training for operating and handling of the tools and gadgets. Such training would improve conservation measures in an institution.

Conservation staff need to be trained in improving their efficiency, in learning about modern conservation techniques and adopting the proper methods of conservation. The methods

include using the right materials and substances of conservation, proper handling and proper storage. Quite often, applying wrong methods proves to be more harmful than leaving the manuscripts unattended.

At present, conservation training and studies have been upgraded from certificate, diploma levels to post-graduate and Ph.D., level research studies. These courses are offered by National Museum Institute, New Delhi

Model for Manuscript Library Conservation Procedures

Different techniques need to be adopted in different manuscript libraries depending on the library's layout, total number of its manuscripts holdings, present condition of the manuscripts, their importance etc. The following are some tips in this regard.

Handling and Storage Tips

Manuscripts need to be protected by keeping wooden boards or dried *kusha* grass above and below the volume and also by tying it up with soft string in the case of palm leaves. Paper manuscripts should be kept wrapped in cloth. The conservator should handle them with great care. He should avoid carrying several manuscripts at the same time, instead carry only one or two keeping them in boxes lined with cloth spread over a layer of cotton. While taking them out and re-shelving they should be held by both hands. While opening the pages for perusal or inspection they should be untied and retied with care. Manuscripts are to be handled like infants.

Manuscript Conservator

Those who are selected for conservation job should possess the required qualifications regarding manuscripts. He/she should be good natured and well trained. Conservators should be steady

minded, and by nature patient and diligent at work. They should have an enthusiasm in what they are doing and the quality of forbearance. An attitude of indifference or lack of whole-heartedness in work would result only in damage to manuscripts.

Training

Conservation procedures have to be acquired through training. Reading or listening to lectures is not sufficient. Not only training, but interaction with training instructors and knowledge of various conservation techniques adopted in various places are also helpful.

Manuscript Repositories

Storage rooms for manuscripts should be well-ventilated, maintained with constant temperature and moisture levels. They should not be exposed to direct sunlight and rain and the windows should be fitted with mesh screens. If it has air-conditioning, it should be on all the 24 hours with temperature ranging between 18° and 22°C, and relative humidity from 50% to 55%, ensured by equipment for automatic maintenance of levels.

In air-conditioned rooms manuscripts may be stored in open steel or wooden racks. In non-air conditioned rooms, closed wooden almirahs would be suitable. Coating of oils like citronella on manuscripts for retention of essential moisture can be made. Since citronella oil can dissolve some paints, manuscripts coated with this oil should be preserved in unpainted wooden shelves. Paper and palm leaf manuscripts should not be kept together inside the same room. This is because the oil coating on palm leaves turn into vapour and mix with the atmospheric air in the room which in turn will be absorbed by paper manuscripts leading to stains on paper. Therefore, paper manuscripts should be kept in closed almirahs after protecting them with acid-free cardboard and wrapping

the box with red cloth. In houses having just one or two manuscripts, they may be kept wrapped up in red or yellow cloth or in acid-free cardboard boxes made to the dimensions of the manuscripts.

Periodic Checks

It is essential to open manuscripts rooms at regular intervals for inspection. If the manuscripts are kept inside almirahs, the almirahs should be opened and manuscripts should be inspected once in a month. Cleaning is essential before the onset of rainy season. Post-rains manuscripts should be opened and spread out to dry. Though air-conditioned rooms are free of dust, manuscripts there should be inspected at least once in a year.

Registry of Important Manuscripts Worldwide

With a view to saving manuscripts across countries worldwide, the UNESCO has launched a project named “Memory of the World”, the project of Registry of Manuscripts. The project also has become a platform for cherishing the heritage value of manuscripts by people at large.

Saving Manuscripts

Conservation of manuscripts involves protecting them from pests and fungi, in addition to the care in handling and storing the same. The storage room should not only be visually inspected but the movement of insects detected by monitoring devices. While cleaning manuscripts, soft cotton cloth or cotton swab can be used. The wiping should be unidirectional. Rubbing in repeated strokes or rotary movement should be avoided. Manuscripts should be held gently in one hand without applying much pressure. Overuse of chemicals should be avoided while

preserving manuscripts. But chemical fumigation to repel and to kill pests can be used when necessary.

Pest control through freezing method, though prevalent in western countries, is not employed in India. If pests are present only in a few number of book, those books can be kept in air-tight bags and the air inside completely sucked out. The pests inside the manuscripts would all die by this treatment. This can be done by making use of bags that are supplied with book-cleaning vacuum machines. Biological control of pests can be done by learning of the life cycle patterns of the pest and the atmospheric temperature and humidity, which they need for survival. That is, they will not survive if the temperature and humidity are maintained at a level higher or lower than the one required for their survival.

Fungal growth in storage rooms can be controlled by natural aromatic substances like sweet flag, black cumin, sandal, clove, camphor and by substances with medicinal properties such as neem, pongamia (*Millettia pinnata*), ashwagandha, or eucalyptus.

Manuscript repositories in India have not been following proper conservation methods. The adoption of Western methods of conservation led to the abandoning of traditional methods and naturally available substances. Lack of awareness and unconcern led to the loss of a large number of manuscripts. Starting from the 1970s a new awareness has come all over India for protection and preservation of cultural artefacts and manuscripts. Various private sector, as well as public sector undertakings have taken up conservation measures, research in conservation and, publication of this information and facts. Institutions that provide training in conservation have come up. Both governments at the state and the central levels provide

funds as incentive for enumeration and conservation of manuscripts. The awareness for conservation of manuscripts has also spread among the public. So, there is hope for proper preservation of surviving manuscripts in private and government institutions.

Minor damages caused at the time of handling manuscripts should be repaired with the right method and the right material. Those who have no idea of these techniques should keep the damaged manuscripts simply bundled up without attempting to repair them. Wrong methods and materials used during restoration may lead to more serious damage. While carrying out maintenance, the following points must be borne in mind.

- Material used for repairing should not cause change in color or cause fresh damage.
- Repair substances should be removable after repair without damaging the manuscripts.
- Colour of repair substances should match the colour of manuscripts.
- Frequent photographing is to be avoided since they cause damage to manuscripts.
- Original manuscripts should never be left unprotected just because digital or Photo copies have been made.

If the conservator uses materials chosen and approved by scientifically proven methods and tests and preserves manuscripts at the required constant temperature and humidity levels manuscripts can be preserved for long time.



CONCLUSION

Manuscripts are authentic records of knowledge that carry firsthand information about people, their lands, their knowledge and culture, in a systematically formal and written mode. The earliest extant palm leaves used for writing date from 2800 BCE onwards. After the invention of paper from 12th century CE onwards, handmade paper was used for writing in India. Conservation of these manuscripts of the past is needed not only to prevent or arrest deterioration of manuscripts but also to treat the affected manuscripts and restore them to their original form to the extent possible. Conservation is an unending process. For successful conservation we need to know the basic constituents of the manuscript material, its method of preparation, and causes of deterioration. In addition to these, proper storage, preservation and restoration techniques have also to be applied and employed.

This book provides a comprehensive account of the origin of alphabets, various writing materials; details of palm leaf and paper manuscript preparation, writing techniques, traditional methods of storage and handling techniques, various factors that cause deterioration and methods of controlling them, and the efficacy of indigenous materials

and methods employed in preventive, as well as curative, conservation. Various traditional systems of storage, handling, and the usage of traditional materials for preservation have also been evaluated. With the progress of science, sophisticated instruments and equipment came to be used in the methods of conservation.

This book underscores the fact that conservation techniques and materials used for certain objects in a certain climatic condition are not suitable for other materials under different climates. On the other hand, such blind adoption could even turn out to be harmful. In general, conservation processes followed in one country or one climatic region, cannot be employed in other countries or regions of a different climate. Hence it is essential to find particular conservation processes and materials suitable for conservation of our cultural artefacts, of which manuscripts are a part. Only such climate-cum-environment specific conservation methods would ensure longevity to our manuscripts. Hence there is a dire need for an awareness of all aspects of the qualities of materials to be conserved and techniques of conservation to be adopted. This book thus furnishes the primary ideas to the conservator and the manuscript holders.

The common proverb, “prevention is better than cure,” is all the more relevant in the discipline of conservation. Yes, methods of conservation have to acquire the status of a scientific discipline. Our cultural properties, like

manuscripts, have to be maintained with constant care and alert observation. It is the duty of every citizen to pass our historical tradition and knowledge to future inhabitants. The field of conservation is new to the young generation and deserves to be included in various related courses to perpetuate the knowledge of our past traditions and culture. After all our past traditions are the fountain springs of our present civilisation..



Annexure -1

Indigenous materials used for Preservation of Manuscripts

Plant name	Part of the plant	Usage
Neem tree (Azadirachta indica)	Dried leaves, and Oil	Insects and Fungus repellent
Nirgundi leaves (Vitex negundo)	Dried leaves	Insects and Fungus repellent
Eucalyptus leaves (Eucalyptus)	Dried leaves	Insects and Fungus repellent
Tulsi leaves (Ocimum tenuiflorum)	Dried leaves	Fungus repellent
Cedar tree (Cedrus)	Dried wood and Oil	Insects and Fungus repellent
Sandal tree (Santalum album)	Dried wood and Oil	Insects and Fungus repellent
Agar tree (Aquilaria agallocha)	Dried wood	Insects and Fungus repellent
Pungai leaves (Milletia pinnata)	Dried leaves	Fungus repellent
Sweet flag (Acorus calamus)	Dried stem or powder	Insects repellent
Pepper (Piper Nigrum)	Dried powder	Insects repellent
Cloves (Syzygium aromaticum)	Dried powder	Insect repellent
Turmeric (Curcuma longa)	Dried powder	Fungus repellent
Camphor (Cinnamomum Camphora)	Crystal form	Fungus repellent



Palm Leaf Manuscript



Female
Palmyra
Tree



Male
Palmyra
Tree

Stylus Types



Writing Method



Coccinia Indica



Datura



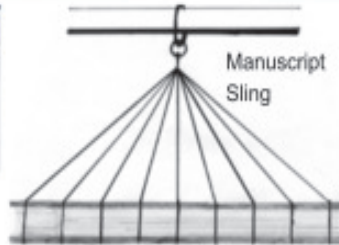
Partially Blackened Palmleaf



Fully Blackened Palmleaf



Manuscript with Proper Binding



Palm Leaf Document Bundle



Palm Leaf Document with Seal



Manuscript Storage Cupboard



Wrapped with Red Cloth

Dust accumulated Manuscript



Bookworm damaged Manuscript



Fungus damaged Manuscript



Termite damaged Manuscript



Completly damaged Manuscript

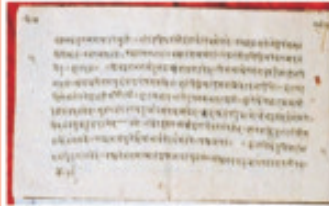


Improper Storage



Palm leaf Manuscript
wrong restoration

Paper Manuscripts



Paper Manuscripts



Cloth used for Manuscript wrapping in olden days



Acid - free manuscript box



Insect repellent materials



Applying of
oil to palm leaves

Reproduction of palm leaf manuscript by laser writing



REFERENCES

Books

- Agrawal, O.P., *Conservation of Manuscripts and Paintings of South East Asia*, Butterworth, London, 1984.
- Agrawal, O.P. and Mandana Bakshi, *Conservation of Books, Manuscripts and Paper Documents*, INTACH, Indian Council of Conservation Institutes, Lucknow, 1997.
- Agrawal, O.P. and Sinha, S.N. *Manuscripts, Books, Archival and like Materials in India:*
- Agrawal, O.P. *Conservation Status and Needs*, INTACH, Indian Council of Conservation Institutes, Lucknow, 1995.
- Barrow, William J, *Manuscripts and Documents: Their Deterioration and Restoration*, Chariottes Ville, Virginia, 1972.
- Biswas, Subas C. *Bibliographic Survey of Indian Manuscripts Catalogues*. Eastern Book Ltd, Delhi, 1998.
- Brookfield, Karen. *Writing*. Dorling Kindersley, London, 1993.
- Burnell, A.C. *Classified Index to the Sanskrit Manuscripts to the Palace at Tanjore*. 3 parts. Turner & Co, London, 1880
- Burnell, A.C. *Elements of South Indian Palaeography from 4th to 7th Century AD*. Turner & Co., London, 1876.

- *Citra Pothi: Illustrated Palm leaf of Manuscripts from Orissa*. Arnold Heinemann, New Delhi, 1955.
- Cunha, G.M and Cunha, D.G., *Conservation of Library Materials*, Methuen, New York, 1977.
- De Silva, Wa. *Catalogue of Palm leaf Manuscripts of Colombo University Museum*. Colombo.
- *Descriptive Catalogue of Sanskrit manuscripts*, Vol19. TMSSM Library, Thanjavur, 1929.
- Elankumaran. *Suvadikkalai*. Arima publication, Salem, (in Tamil)
- Gaur, Alberine. *Writing materials in the East*. The British Library, London, 1979.
- Gurumurthi, S. *Education in South India (Ancient and Medieval Records)*. New Era Publication, Madras, 1992.
- Hunter, David. *Paper Making: The History and Technique of an Ancient Craft*. Dover Publications, New York, 1974.
- Jayaraj, V. *Care of Archival Materials*. Government Museum, Chennai, 1999.
- Kanthaiya pillai, N, C., *Tamizh India*. Saiva Siddhantha Book Publishing House, Tirunelveli, 1945. (in Tamil)
- Katre, S.M. *Introduction to Indian Textual Criticism*. Poona, 1954.
- Kathpalia, Y.P. *Conservation of Books and Archival Materials*. UNESCO Press, 1962.
- Kovaimani, M.K. *India Kaalakkanitham (A.D. 700-1999)*. Paamozhi Publishers, Thanjavur, 1997. (in Tamil)

- Krishnamoorthy, A. *Catalogue of the Palm leaf Manuscripts in the Libraries of Europe*. 1960 (Unpublished manuscript)
- Kumar, P.S.G. *Indian Library Chronology*. Metropolitan Book Co., New Delhi, 1977.
- Losty, Jeremiah P. *Art of the Book in India*. British Library, London, 1982.
- Mahalingam, T.V. *Early South Indian Paleography*. University of Madras, 1974.
- Mukhapadhyay, K.K. and Guha, P.S. *Library Conservation*. Information Research Academy, Calcutta, 1990.
- Murray, John (ed). *Curiosities Literature*. Ed5. London, 1817.
- Narita, Kiyofuse. *Life of Ts'ai Lung and Japanese Paper Making.*, Paper Museum, Tokyo, 1980.
- Relly, James Metc. *New Tools for Preservation: Assessing Long Term Environmental Effects on Library and Archives Collections*. the Commission of Preservation and Access, Washington, USA, 1998.
- Oppert, Gustav. *List of Sanskrit Manuscripts in Private Libraries in South India*. Madras, 1885.
- Paramasivam, Tha. Ko. *Suvadippathippu Nerimuraikal*. Tamil University, Thanjavur, 1986, (in Tamil)
- Percival, Robert. *Account of the Island of Ceylon*. C and A Baldwin, London, 1803.
- Piyadasa. *Libraries in Srilanka: Origin and History*. Sri Satguru Publisher, New Delhi, 1985.

- Plumbe, Willfred J. *Preservation of Books in Tropical and Sub-tropical Countries*. Oxford University, London, 1974.
- *Report of Workshop on Micrographic Technique*. Indira Gandhi National Centre for Arts, New Delhi, 1996.
- Robinson, Andrew. *Story of Writing*. Thames and Hudson, London, 1995.
- Richardson, Ernest Curling. *Beginnings of Libraries*. Humphrey Milford, London, 1914.
- Samuel, John. *Uthirum Tamil Malarkal*, Institute of Asian Studies, Chennai, 1994 (in Tamil)
- Swaminatha Iyar, U.Ve. *En Charitham*. U.Ve. Swaminatha Iyar Library, Chennai, 1990. (In Tamil)
- Swaminatha Iyar, U.Ve. *Nalluraikkovai*, Kayilai Press, Chennai, 1945. (In Tamil)
- Swaminatha Iyar, U.Ve. *Naan Kandathum Kettathum*. Sekar Press, Chennai, 1936. (In Tamil)
- Shivaganesha Murthy, R.S. *Introduction to Manuscriptology*, Sarada Publishing House, Delhi, 1996.
- Stewart, Charles. *Descriptive Catalogue of the Oriental Library of Tipu Sultan*. Cambridge, 1809.
- Subramaniam, Pu. *Suvadiyiyal*. International Institute Of Tamil Studies, Chennai, 1989. (in Tamil)
- Taylor, Issac. *Alphabet: An Account of the Origin and Development of Letters*. Asian Educational Service, New Delhi, 1991
- Thillainayagam, Ve. *Indian Library Movement*. Pari Nilayam, Chennai, 1981. (inTamil)

Articles and Paper Presentations

- Anupam Shah.”Palm Leaf Manuscripts of the World: Material,Technology and Conservation,”*Reviews in Conservation*, No.3.2002.
- Bansal, N.C. “Manuscript Preservation in India: A View,” (Paper Presented in the International Seminar on Manuscript Conservation at Virinthavan Research Institute, Mathura, August 2003)
- Dutta ,P.K. “Notes on Sanchipat Manuscripts of Eastern India,” (Paper presented in a Seminar in the Victoria Memorial Hall, Calcutta. *Dinamani*, June 24, 2005 (Tamil News Paper)
- The Hindu Nov 6, 1980, Nov 18, 2002, and Jan 6, 2004.
- Indian Antiquary, Vol 1, 1872-73.
- Lawson, Peter. “Palm leaf Manuscripts and their Conservation,”*Library Conservation News*, nos.16&17, pp 43-45.
- *MBLD News Letters*, Oct 1987.
- Kovaimani, M.K. ManuscriptsWritten from Printed Matter (paper presented in a Seminar in Tamil University, Thanjavur, 1990. (in Tamil)
- “Paper Making,” *Tappi Journal*, Vol 67, Feb, 1984
- *Restaurator*, Vol 1, 13&15



- P. Perumal was born in 1954 in a village of Dindigul District, Tamilnadu. He did his B.Sc (Spl), M.L.I.Sc, and M.A, at Madurai Kamaraj University.
- Joined as Conservator in the Thanjavur Maharaja Serfoji's Sarasvati Mahal Library, Thanjavur in 1980 and retired in 2012.
- Specialized in conservation of palm leaf and paper manuscripts, books and miniature paintings. Did his Ph.D in history and development of manuscript conservation.
- Has undergone six month UNESCO sponsored Conservation Course in NRLC, Lucknow in 1988-89, three week ICCROM sponsored International Japanese Paper Conservation course in Japan and three month intern training in the libraries and museums of U.K under Nehru Fellowship.
- Conducted several short-term training courses, workshops and seminars on conservation and participated in the International conferences held at Leyden, Netherlands and at Halle, Germany.



Price : Rs. 150.00